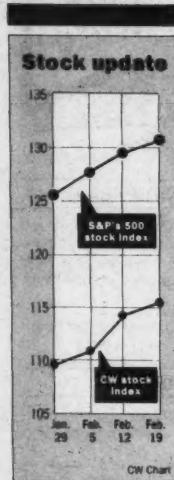


# COMPUTERWORLD

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FEBRUARY 24, 1986

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NEWSPAPER

## TOP OF THE NEWS

Leading micro industry executives met last week at the Annual PC Forum, expressing cautious optimism about business. **Page 126.**

**Prime Computer** offers to convert its terminals with IBM Personal Computer-compatible kits. **Page 9.**

**Merger reality hits Multimate International**, where new owner Ashton-Tate plans to eliminate more than one-third of the firm's work force. **Page 6.**

**Software spending** is expected to grow at about 25% a year for the remainder of the decade. **Page 19.**

**AST Research, Inc. today** is set to announce its acquisition of Camintonn Corp., a Santa Ana, Calif.-based developer of memory expansion devices for Digital Equipment Corp.'s Q-bus, Microvax II, VAX 11/730 and VAX 11/750. AST has been recruiting engineers with experience in DEC-compatible memory devices, signaling its intent to move beyond sales of micro add-on devices.

**IBM plans to double** the RT Personal Computer's processing power on a roughly annual basis, according to Frank King, IBM's group director for advanced engineering system development. Asked why IBM chose a reduced instruction set computing processor rather than Intel's forthcoming 80386 chip, King said, "The RT is a 386 with a two-year lead."

**The West Coast conference**, "Supercomputers Get Down to Business," scheduled for tomorrow and Wednesday, will not get down to business as planned. The meeting was postponed after too few executives from large businesses signed up. The sponsor, ZeroOne Systems, Inc. of Santa Clara, Calif., will reschedule.

**Sperry Corp. last week** detailed the See **NEWS** page 8

## Market battle drives Apollo

Broader lineup heats contest with DEC, IBM

By **Rosemary Hamilton**

BOSTON — Attempting to shore up its strong lead in the increasingly competitive engineering workstation market, Apollo Computer, Inc. last week replaced the bulk of its product line.

Once a dominant player in a specialized market, Apollo in the past year has been under pressure from low-cost vendor Sun Microsystems, Inc. and aggressive mini-computer vendor Digital Equipment Corp. Last month, IBM introduced its own workstation product [CW, Jan. 27], a move that threatened to rewrite the rules of the business that Chelmsford, Mass.-based Apollo

See **MARKET** page 4

## Compaq unveils lighter portable

By **Eric Boder**

HOUSTON — Compaq Computer Corp., which took its first steps on a four-year road from start-up to Fortune 500 status by launching an IBM-compatible portable computer, last week rolled out a successor mainstream portable.

The unit, dubbed the Portable II, is a slimmed-down version of the original Compaq portable and is built around an Intel Corp. 80286 processor.

Total unit size has been cut 30% from the original, while weight has been reduced by 17%. The Portable II's three models range in weight between 24 and 26

See **COMPAQ** page 8

## User firms support COS on standards

By **Elisabeth Horwitt**

ROSEMONT, Ill. — Several major user organizations endorsed the Corporation for Open Systems last week, adding momentum to the drive initiated by leading vendors earlier this year to develop a testing process that rates systems' interconnectivity.

At a briefing in suburban Chicago, Boeing Co. and Eastman Kodak Co. became the first user corporations to join COS, while a General Motors Corp. spokesman said his company expects to join soon.

Michael Kaminski, manager of Manufacturing Automation Protocol programs at GM, said he was "99% sure" that his company would make a commitment to COS. Also endorsing the nonprofit standards organization was the national Manufacturing Automation Protocol and Technical Office Protocol Users Group, which comprises members from 650 to 700 leading corporations.

COS said it plans to develop facilities and specifications to test vendor products for compliance with communications standards such as Integrated Services Digital Network and Open Systems Interconnect. The goal is to ensure "that users will know which vendors will shake hands with each other," said Edward Matthews, vice-president of strategic planning at Northern Telecom, Inc. and cofounder of COS.

Answering attendee questions regarding what they would receive in return for their \$25,000-plus yearly membership fees, A. G. Biddle, COS founder and president of the Computer and Communications Industry Association, replied, "You get the opportunity to be right in the middle of what's going on. You get a two- to three-year lead time on your network installation because you get a preview of what

See **USER** page 6

## CW EXCLUSIVE

### Help wanted: Managers cope with data entry shortage

By **Donna Raimondi**

**G**ary Kelley needed to hire a data entry operator. And this manager of user services at Dennison Manufacturing Co. in Framingham, Mass., thought that finding a data entry operator would be one of the more routine tasks he would have to perform. It wasn't.

Kelley put ads in four different newspapers. He called a dozen employment agencies. He asked around the local technical high school and called the Internal Revenue Service, knowing of its insatiable data entry needs. He says that before his trying three-month search finally bore fruit, "we came close to running radio ads to see if that would work."

Data entry operators — the descendants of keypunchers who used to come "a dime a dozen," according to one DP manager — seem to be a disappearing breed in some areas. Managers who seek these valuable data entry operators may have to try harder than ever before to find them.

The result of the shortage, according to conversations with data entry managers across the country, is that management is being forced to be innovative and diligent in recruiting data entry personnel. Management is looking to incentive pay programs, better working conditions and more respect for data

entry operators in its efforts to find and keep good staffs.

The Data Entry Management Association says it believes that the problem is isolated in areas that now experience atypically low unemployment rates. According to association President Norman Bodek, Dennison's Kelley was hampered most in his search by Massachusetts' low, 4% unemployment rate. "Four percent is like no unemployment," Bodek observes. "Nobody can find data entry help in the Boston area."

Several factors are emerging as reasons for the increasing shortage of data See **MANAGERS** page 12



Kelley

# IBM boosts maintenance, rental rates by 8% to 15%

Hikes small peripheral, per-call service charges

By James Connolly

RYE BROOK, N.Y. — IBM late last week announced rental and maintenance price hikes ranging from 8% to 15% for a variety of products, particularly small peripherals. However, most current-generation CPUs and large peripherals will be unaffected by the fee hike.

The greatest increase is for per-call maintenance, where the hourly charge was raised 15%, effective immediately. Other increases will not take effect until at least June 1.

An IBM spokesman noted that most 3080, 4300 and 3090 CPUs are purchased or leased from third parties such as IBM Credit Corp. The 3340 disk drive, 3708 controller, 3830 controller, 8100 CPU and the System/88 were excluded from the rental increases.

He said a typical product affected by the 8% rental hike is the IBM Displaywriter system. The monthly rental fee for a Displaywriter Model B10 display station that qualifies for a government discount is being raised from \$510 to \$550.

*The rental increase is unlikely to affect materially a customer's decision on whether to buy or lease a product.*

begin after March 1 will be unaffected until March 1, 1987.

However, per-call maintenance charges for the IBM National Service Division are being increased by 15%, effective immediately. An example of the hourly rate for such maintenance reflected an increase from \$165 per hour to \$190 per hour during regular work hours and from \$190 to \$219 outside regular hours.

## IBM describes development efforts, details Micro-370 processor chip

By James Connolly

ANAHEIM, Calif. — Emphasizing that it was not announcing new products, IBM last week provided indications of the direction of its chip development, including a "mainframe-on-a-chip" microprocessor, in technical papers presented to the International Solid State Circuits Conference being held in Anaheim.

In addition to the 32-bit microprocessor known as Micro-370, on which 100 IBM System/370 instructions are stored, IBM described a 32K-bit, 3-nsec bipolar random-access memory (RAM) chip and a 64K-bit CMOS memory chip.

An IBM spokesman stressed that papers presented by IBM researchers and other companies' researchers were intended to provide other scientists at the conference with updates on research done in the past year. He added that the chips are experimental, and he declined to speculate on when products may be available.

A semiconductor industry analyst for Dataquest, Inc. in San Jose, Calif., Sheridan Tatsuno, said that the CMOS chip with a 1.35-micron average line width appears comparable to what several small U.S. start-up companies and several Japanese companies, which have claimed 1.2-micron line widths, are trying to produce. Tatsuno said that such a CMOS chip could produce the low-power de-

mands necessary for a laptop micro. IBM claimed that the CMOS chip can provide an access time of 15 nsec with a single level of metal and an access time of 10 nsec if a second layer of metal is added. The company said the physical design was done with a ground-rule independent layout program that accommodated basic changes during the design cycle.

### Tested at rates up to 18 MHz

The Micro-370, which features 93,000 transistors, was designed to operate at 10 MHz and has been tested at rates up to 18 MHz. However, IBM officials warned that the chip is still significantly slower than the existing 18.5-nsec mainframes with which it shares an instruction set.

The 100 System/370 instructions are installed in read-only memory. IBM researchers said the chip supports software emulation of the remainder of the instruction set, which can be stored on separate chips.

The company also said its 3-nsec, 32K-bit, static RAM bipolar chip is one of the first of its kind to incorporate a transistor having both a polysilicon base to provide high-speed switching and a polysilicon trench isolation. That trench is intended to allow tight packing of transistors. The memory chip could provide a cache or control store capability in large computers, one IBM paper said.

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## NEWS

# Market battle drives Apollo

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largely developed.

Apollo's new products include three workstations based on the Motorola, Inc. 68020 microprocessor and the Motorola 68881 floating-point coprocessor plus a compute server based on the Alliant Computer Corp. superminicomputer.

"It's what people have been waiting for," said Lawrence Hickey, an analyst with First Analysis Corp. in Chicago. "A major criticism has been that Apollo's product line has been too narrow."

Among the products that Apollo will phase out are its DN600 and DN460 workstations. These are expected to be off the market within 12 months, company spokesmen said.

The new workstations are the DN580, a high-end system designed for real-time, two-dimensional and three-dimensional graphics with an entry-level price of \$43,900; the DN570, designed for 2-D graphics and said to fill the slot as the company's mid-range product with an entry-level price of \$29,900; and the Series 3000 Personal Workstation, which will replace Apollo's existing DN300 line as the low-end model, although it offers equal performance to the company's former top-of-the-line model, the \$52,500 DN660, and has an entry-level price of \$14,900.

The compute server, the DSP9000, has a starting price of \$195,750 and can be expanded to eight computational elements, which will sell for \$325,250. Each element contains an Alliant unit, which is made up of a set of multiprocessors.

## 'Sheer, raw computer power'

One early user of the DN580 said he was not prepared for the "sheer, raw computer power and graphics capabilities" of the workstation. David Burlison, workstation systems manager at Structural Dynamics Research Corp. in Milford, Ohio, said the DN580 was able to do the same work load of software testing that one DN460 and two DN660s had been doing. His company markets mechanical computer-aided design software and plans to sell packages that will run on Apollo's new product line.

Apollo stressed that the new systems are open-architecture, Unix-

## Apollo Computer, Inc.'s workstation family

	Domain Series 3000	DN570	DN580
MIPS <sup>1</sup>	1.2	1.3	1.3
Whetstones	780	2,000	2,000
Memory (Megabytes)	2-4	2-16	2-16
Color Resolution (Pixels)	1,024 by 800 <sup>2</sup>	1,024 by 800 <sup>3</sup>	1,280 by 1,024 <sup>3</sup>
Disk Capacity (Megabytes)	72	308	308
Clock Speed (MHz)	16	16	16
Two-Dimensional Transformed Vector/Sec.	6,500	40,000	100,000
Base Price *	\$9,900	\$29,900	\$43,900

<sup>1</sup> Million instructions per second

<sup>2</sup> 15-in. screen

<sup>3</sup> 19-in. screen

\* Excluding disk drives

CW Chart

based products. The company has been criticized for its Domain proprietary architecture, and Edward Zander, vice-president of marketing, conceded last week that Apollo lost market share to Sun Microsystems last year because Sun provided a Unix-based workstation environment.

The new workstations will operate under Apollo's version of Unix, Domain/IX, which offers users two versions of the operating system: AT&T's System V and the University of California at Berkeley's 4.2 Unix.

Domain/IX, first announced in mid-1985, is also available on the company's old product line, which makes all of Apollo's workstations compatible, Zander said. Even though the majority of the old workstations will be phased out, users with the existing products will be able to incorporate the new line into their Domain networks.

## Phasing out DN300, DN600, DN460

The systems being replaced include the low-end DN300 line, which ranged in price from \$9,900 to \$18,900; the high-end DN600; and the DN460 high-end monochrome system. The company said its DN560, the \$35,000 former mid-range workstation, could possibly remain a viable product.

For now, Apollo said it plans to "judge the market reaction to see if it makes sense" to establish an upgrade policy for the DN560 to the DN570 or DN580.

The workstations will be available within 60 days of order, and the compute server will be shipping in May, the company said. A monochrome version of the Series 3000, with a diskless price of \$9,900, will also be shipping in May.

The company said an IBM Personal Computer AT-compatible co-processor board is under development and will be offered for the Series 3000 this year, most likely in the third quarter.

The board is a collaboration between Apollo and Phoenix Software Associates Ltd. and will reportedly allow users to run IBM Personal Computer AT software on a display window of the workstation.

## Desktop Series 3000 comes with bus

The desktop Series 3000 comes with an IBM Personal Computer AT-compatible bus that allows users to add personal computer peripherals such as printers and scanners to the Domain workstation environment.

For the new high-end model, users can purchase a 3-D Graphics Accelerator, based on the emerging Programmers Hierarchical Interactive Graphics Standard. By providing virtual memory processing techniques, the 3-D Graphics Accelerator, which sells for \$9,900, allows users to manipulate 3-D graphics data in real time at a speed of 100,000 vector executions per second.

Apollo claims that it outdoes IBM, DEC and Sun Microsystems in terms of million instructions per second ratings, floating-point performance, graphics and networking capabilities for either lower or comparable price. Such competitive comparisons are bound to be refuted by the competition. At least one analyst said the point-by-point comparison is not the issue.

"What's significant is that there is no one vendor that has anywhere near what Apollo has now. You can credibly say they are now a full-line workstation supplier and really the only one," said Mark Stahlman, an analyst with Sanford C. Bernstein & Co. in New York.

"I think by summer we'll have a pretty equivalent lineup," Sun spokesman Tom Hime said. "Their low-end color won't be available for at least 120 days. We could have announced our color low end when we announced the monochrome unit last month, but we prefer to wait until we're ready for volume shipments. It'll be shipping by summertime."

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**Run With The Leaders**

## NEWS

## Compaq unveils lighter portable

From page 1

pounds, according to Compaq.

While the improved 80286 system was expected [CW, Feb. 17], there was also speculation until very recently that Compaq would enter the same laptop portable waters that IBM reportedly is about to enter. "The laptop's hour isn't here yet," Compaq President Rod Canion stated.

Analysts attending the entertainment-filled Portable II debut generally gave high marks to the machine, with the only significant criticism directed at pricing. Compaq executives responded that costs were below those of similarly configured IBM desktop 80286-based products.

Portable II prices start at \$3,499 for a model with 256K bytes of internal memory and one 360K-byte floppy disk. A similar dual-floppy version sells for \$3,599, and a 640K-byte configuration with a floppy drive and a 10M-byte hard disk drive costs \$4,799. All models include two expansion slots, one for 8-bit boards and the other for 8- or 16-bit boards, and are available immediately.

### 'There's no competition'

"This will stimulate the portable market; at 25 pounds, it's much easier to carry," said Michele Preston of L. F. Rothschild, Unterberg Towbin. She commented that pricing seemed appropriate and added, "Besides,

there's no competition."

Simultaneously, Compaq cut prices by 18% on its standard Portable, to \$2,199, and by 20% on its Portable Plus hard disk drive model, which is now \$3,199.

While the company will continue to build and sell both these systems and its existing Portable 286 family, all will reportedly be merged into the Portable II line over the next several years.

Compaq decided against offering a

**'This will stimulate the portable market; at 25 pounds, it's much easier to carry.'**

— Michele Preston  
L. F. Rothschild, Unterberg Towbin

laptop at present because "too many functional tradeoffs have to be made," according to Canion. Among these, LCDs are too hard to read and electroluminescent displays suffer from high power consumption, expense and insufficient resolution, Canion maintained.

Battery-powered designs also provide limited CPU power and expansion capabilities, he said, and while 3½-in. floppy drives save space and weight, they are incompatible with standard personal computers.

"Even IBM will have a difficult

time introducing 3½-in. drives," predicted marketing Vice-President Mike Swavely. "Customers have been slow to accept even 1.2M-byte diskettes, although they are the same size. Three and a half inches is going to be worse."

Bowing to these concerns, Compaq also filled out its Deskpro 286 line with two systems offering 360K-byte floppy disk drives, with costs starting at \$4,144.

### Portable 286 to stay at high end

The company will continue to position the Portable 286 system as its high-end portable. The earlier line offers greater storage and expandability than the Portable II, including an optional tape backup system.

As with the Portable 286, the Portable II's CPU runs at 6 and 8 MHz. Internal memory can be expanded to 2.1M bytes without using an expansion slot and to 4.1M bytes with one slot. The hard-disk model disk controller is integrated into the drive, keeping both expansion slots open.

A standard 9-in. Compaq monitor is included. Except for the placement of 10 function keys across the top, the 84-key keyboard is similar to existing models. Parallel, serial and monitor interfaces are built in.

Compaq cofounder and Engineering Vice-President Jim Harris listed a number of enhancements over earlier products, including quieter fan operation and a stand that gives a choice among viewing angles. An option for international travelers automatically senses the difference between domestic and international current.

## TOP OF THE NEWS

NEWS from page 1

operating system license fees it will charge users who purchase Sperry mainframes from sources other than the company [CW, Feb. 17]. The charges are \$175,000 for an 1190; \$125,000 for an 11/80; \$75,000 for an 11/70 or 11/60; \$22,000 for a System 80 Model 8; and \$15,000 for System 80 Models 3, 4, 5 or 6. Sperry did not discuss why it instituted the charges.

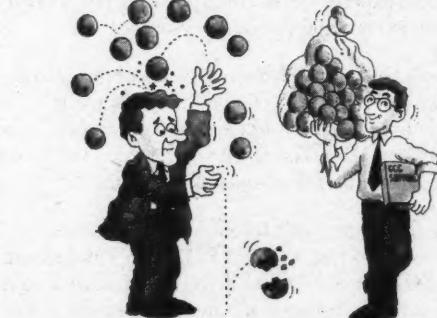
A graphics-oriented version of IBM's Topview operating environment seems unlikely to appear anytime soon in commercial form. Robert Carberry, vice-president for program development and operations at IBM's Entry Systems Division, indicated last week that major design decisions were still being weighed for the version.

A new technique for studying magnetic surfaces, developed at the U.S. Department of Energy's Argonne (Ill.) National Laboratory, may contribute to the development of subminiature computers and other electronic devices. "The ultimate size limit in miniature electronic circuits," scientist Samuel Bader said, "could be a layer of magnetic material one atom thick deposited on a supporting surface. This kind of ultrathin magnetic film might also be used in smaller, faster computer memories."

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# Prime rolls out IBM-compatible add-on for terminal line

## DBMS offerings run on desktops, large systems

By Eric Bender

NATICK, Mass. — Prime Computer, Inc. will formally reach out to embrace the IBM Personal Computer standard today, unveiling an IBM-compatible option for its PT200 terminal line, along with assorted software products designed to integrate desktop and large systems processing.

"We have added full IBM PC compatibility, for both hardware and software, to the PT200," said Len Halio, Prime's vice-president for video products. The new PC Option allows users to run micro software packages simultaneously and access a host system, "a rather distinct feature for people in large systems environments," he claimed.

Introduced a year ago, the PT200 was designed as a multifunction, expandable terminal, Halio noted. The PC Option enhances the terminal with an Intel Corp. 8088-based micro system. The upgraded terminal can

Prime currently offers a series of word processing workstations, primarily built by Convergent Technologies, Inc. "We see the two products coexisting," Halio remarked. "The PC will find its way into professional offices, but 'smoking fingers' word processing will stay on the workstations."

Along with PC Option, Prime will unveil Prime Link, which Halio described as "basically a file transfer archiving mechanism that allows you to store MS-DOS files on the host." It also includes the ability to use Microsoft Corp. MS-DOS commands to manipulate a host file system.

Beta user Hughes also commented favorably on Prime Link, although he

suggested he would like to see a higher speed connection to the host or a local-area network option.

Available next month, the software is split into portions running on desktop and host. The cost is \$60 per desktop, and the host fee ranges from \$2,250 to \$10,250.

### PC Information

Additionally, today Prime is set to introduce PC Information, an \$895 micro version of its large system relational data base management product, and several versions of Oracle Corp.'s Oracle data base product.

Available in second-quarter 1986, the PC Information package is a fully functional DBMS that is almost 100%

compatible with larger system versions and provides some linkages between the two systems, according to Ronald Makara, technical marketing manager for Prime Information.

Prime expects its Oracle products to sell to large customers who want to establish SQL as a standard for DBMS setups across a wide spectrum of machines, said Robert Johnson, product manager for data management. The company's personal computer version will cost \$1,000 and is scheduled for second-quarter delivery. Prime Oracle for computer room systems will cost \$45,000, and versions for office environment systems will be priced at \$23,000. Both will be offered next month.

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- pseudo-conversational programming...what it is, why you have to use it, and how it complicates the logic in a COBOL program
- how to use CICS commands for VSAM file handling, terminal handling, and program control
- how to use the HANDLE AID and HANDLE CONDITION commands to

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- how to debug CICS abends using either the Execution Diagnostics Facility (EDF) or a storage dump
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## GAO audit uncovers security lapses in Treasury's network

By Mitch Beets

WASHINGTON, D.C. — The Financial Management Service, part of the U.S. Department of the Treasury, is working to strengthen the security of its electronic payments computer network — which handles \$2 trillion a year — following security audits that found serious deficiencies, officials confirmed last week.

A confidential audit by the General Accounting Office (GAO) discovered inadequate password controls, accounting errors and duplicate payments that were not always detected promptly, officials said. A secret risk analysis study by private consultant reportedly showed that annual losses could reach \$15.4 million in a worst-case security breach.

The focus of the audits was the Treasury Financial Communications System, a network so sensitive that the hardware is located in a vault and transmissions are encrypted. But investigators discovered enough security problems that the Financial Management Service, in its annual management review, could not certify that the system is fully secure.

The audits are the latest in a series of reports that computer systems throughout the U.S. government have security lapses [CW, Nov. 18]. The latest governmentwide analysis by the GAO, issued in December un-

der the Federal Managers' Financial Integrity Act, said that weak security controls have resulted in "increased vulnerability to fraud, waste and abuse in DP systems which make payments to millions of beneficiaries and collect billions of dollars."

### Security-bolstering steps taken

The Financial Management Service released a statement asserting that it has already taken several steps to bolster computer security and plans more extensive software changes by the end of the year. It added that there is no evidence the system has been breached.

In response to the critical audits, the agency has reportedly taken such steps as improving control over passwords, improving the verification of payments, increasing the separation of duties in payment processing, providing extensive computer security training and increasing the use of encryption.

"We chose to put ourselves under the magnifying glass, and we are committed to correcting those problems requiring resolution," said William E. Douglas, commissioner of the Financial Management Service.

The GAO reported that most government agencies have failed to evaluate thoroughly their DP internal controls to identify weaknesses.

## Computer vendors disgruntled with U.S. haggling for discount prices



### WASHINGTON UPDATE

Mitch Beets

Computer and office equipment vendors are upset that the U.S. government apparently wants to get bigger discounts than the vendors give their own dealers.

The controversy concerns the General Services Administration (GSA) policy on multiple-award schedule contracts, which are standing one-year contracts for the purchase of small quantities of commercial items. The GSA has announced that it wants "to obtain a discount from a firm's established catalog or commercial price list that is equal to or greater than the discount given to that firm's most favored customer."

But vendors such as IBM pointed out that their biggest discounts go to dealers and OEMs, because they add value to the products and handle marketing and service. The government should get "fair and reasonable" prices befitting an end user, not a dealer, according to Sue Stuebing, director of government procurement policy for the Computer and Business Equipment Manufacturers Association.

The Federal Communications Commission is moving to place controls on modems that redial repetitively until a circuit connection is established. The action is designed to prevent "potential network harm" such as the excessive congestion that can occur when the computerized redialing software is activated, the FCC said. Telephone companies are pushing for the regulation in order to free tied-up circuits, while equipment manufacturers are less enthusiastic about the change, according to an FCC official. Final FCC action is likely later this year.

The U.S. Department of the Treasury, convinced of the efficiency of electronic funds transfer, recently proposed that all wages and salaries of federal employees be paid by EFT.

A bill drafted by the department was introduced by Rep. Chalmers P. Wylie (R-Ohio) as H.R. 4132. Wylie said the current system of issuing paper checks costs the government 24 cents per check, compared with 3 cents per payment via EFT. The department said it believes EFT would save about \$10.8 million a year.

Wylie stressed that he introduced the bill at the behest of the Treasury Department, and he said he had reservations about denying workers the option of getting a real paycheck.

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## Managers cope with shortage

From page 1

entry operators. The process itself is moving from centralized data entry — typically dozens of "heads down" people in a large room with a supervisor sitting at the front — to distributed, or on-line, data entry, where the operators have several tasks to perform, one of which is data entry.

The disappearance of centralized data entry shops eliminates the training ground for operators, says Richard Brennan, president of Punch City, a data entry service bureau in Watertown, Mass., that employs 50 operators. Schools that sprang up a few years ago to teach data entry skills have converted to teaching broader office automation skills, he adds.

### Dull and drudgery filled

Another reality is that traditional data entry jobs are generally perceived to be dull and drudgery filled. In a low-unemployment area such as Massachusetts, a job seeker can find positions in relatively more varied and challenging fields, like fast food outlets, for the same salaries — typically, \$5 per hour — that data entry candidates are offered.

"People get out of data entry after about two years because it is very mundane," notes Lawrence Feidelman, president of Management Infor-

mation Corp., a Cherry Hill, N.J., publisher of data entry equipment evaluations. By 1990, Feidelman predicts, the present ratio of 60% distributed to 40% centralized data entry will have changed to 90% distributed and 10% centralized. Almost one million people currently work at the job, he adds, with the largest concentrations working in insurance companies and government agencies.

Distributed data entry is by its nature a more interesting job than centralized data entry, he says. The typical distributed data entry staff member has more than one function, such as order taking, and data entry is just one of those tasks.

A profile of data entry operators shows that they are almost exclusively female. Centralized data entry workers are usually in their twenties, have little job experience and have no more than a high school diploma. They are typically trained in-house after proving that they can type 50 words per minute. If they are already trained, chances are they received the training at a special six-week course.

Every data entry manager can point to a few staff members who love their jobs and will stay for many years. "What is boring to one person is not to another," DEMA's Bodek says. "Data entry is a very

challenging job to some people. Good data entry operators must be highly skilled, very fast and accurate."

Some workers profess to want the kind of job that can be left in the office when they go home. Typical operators leave their jobs after two to three years and almost never move to another data entry position.

Managers who want to find operators may have to change the way they traditionally find them. The most effective method of finding

help for Dennison's Kelley has been getting referrals from existing staff members. Among the suggestions given by specialists and employers of data entry operators who are experiencing the shortage of personnel are the following:

- "Hire military dependents," says Ralph Jones, DP manager at the Association of the U.S. Army publishing firm in Arlington, Va. The dependents tend to have a lot of experience in many different areas, and they are well-rounded people because they have moved around frequently, he adds. Managers should keep in mind that employing dependents means there will be turnover because they do move on, but Jones has found that the dependents stay as long as other data entry operators anyway.

- "Look to a marketplace you can use — the housewife," Bodek advises. A lot of the women that are

home with children have good data entry skills. Many of these women are happy to work four or five hours a day if the data entry equipment is in their homes. High school or college work-study programs also offer a good source of workers, he adds.

- Employee referrals and open houses on Saturdays are methods used by James Hinkle Jr., assistant vice-president of production operations at the Institute for Scientific Information in Philadelphia. During open house days, Hinkle tests groups of eight people at a time and gives them orientation talks. If members of the group pass the test and show an interest, they will be interviewed personally at a later date.

Hinkle, who has a data entry staff of about 80 people that key in alphanumeric material, does not give up on people with rusty skills who are returning to the work force. "We will encourage slow typists to go home, find a typewriter and practice for a couple of weeks. Then they come back and test again." Because of growing business and new applications in his shop, he must come up with about 35 to 40 data entry workers in 1986, a task he is finding difficult. The solution to his problem will be to offer overtime assignments to his existing staff, he says.

- Find a good service bureau, Management Information's Feidelman says. The bureaus, which have the same difficulties finding workers as companies do, are sometimes having the keying done in Grenada, Singapore, India and China, often by English students, he adds.

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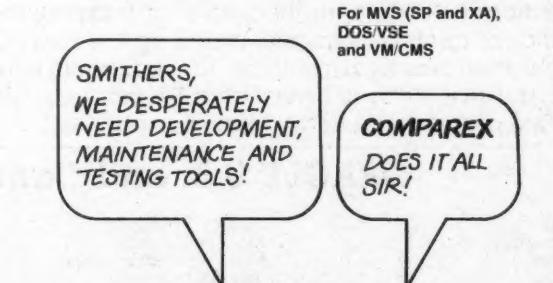
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## Bosses sweeten data entry jobs

### Firms reduce turnover with incentive packages

By Donna Raimondi

Finding good data entry operators is a tough job. Keeping them may be even tougher. Data entry managers have found a variety of ways to make the often boring job a little sweeter.

One fact of life in data entry is that it pays poorly — anywhere from \$5.50 to \$8.50 per hour. The lower rate is much more common. To overcome that obstacle, employers sometimes give incentive pay, usually based on a combination of speed and quality of work. On rare occasions, a fast, error-free and experienced data entry operator with a will to make money can bring in up to \$25,000 a year.

Pleasant working conditions are important, says James Hinkle Jr., assistant vice-president of production operations at the Institute for Scientific Information (ISI) in Philadelphia. "Our data entry people stay longer now than they did 10 years ago because we have instituted a four-day week, an incentive system and good working conditions," he says.

When ISI moved to a new building, the company paid special attention to the data entry room, Hinkle says. The architect separated keyboards from

the noisy computers, installed sound absorption features, staggered the 50 workstations used by two shifts of operators into angular configurations to avoid monotony and put in a lot of windows.

Hinkle also created an incentive program whereby everybody — the data entry operators and the supervisory people — benefits from producing good work rapidly. Because the supervisors' bonuses are tied to those of the operators, the supervisors have a vested interest in helping the operators improve.

Another factor that reduces turnover is up-to-the-minute equipment. "We have always had older computers and had trouble finding people," says Ralph Jones, data processing manager at the Association of the U.S. Army in Arlington, Va. His shop is small, with only three full-time operators now, because he has distributed much of his former data entry work to other departments in the last few years. "Now we have an IBM System/38, so there is not the same turnover that I had with old equipment."

Quickly trimming the data entry department of slow or inept workers is important, says Gary Kelley, manager of user services at Dennison Manufacturing Co. in Framingham, Mass. "The good ones get tired off by having to carry the bad ones, so we don't keep the slow ones very long at all," he says.

## Congress backs retraining for high tech's displaced workers

By Mitch Betts

WASHINGTON, D.C. — The computer manufacturing industry will not be able to absorb many of the workers idled by the declining smokestack industries, so retraining programs are needed to help these workers shift to the service economy, according to a report by the U.S. Congress' Office of Technology Assessment (OTA).

The OTA report is the latest of several reports calling for better retraining programs, and the issue is high on the agenda of both Republicans and Democrats in Congress.

Automation in the factory and the office is contributing to the job displacement, the OTA report said. "In all sectors of the economy — service as well as manufacturing — manual labor and routine mental tasks are vulnerable to computer-based technology," OTA said.

While workers displaced from a declining manufacturing industry could simply move to another manufacturing industry, the report said that high-tech industries cannot absorb large numbers of production workers.

First, OTA said, employment in high-tech industries is skewed toward managerial and professional jobs, and second, the high-tech industries are not immune from layoffs.

Silicon Valley's semiconductor industry, for example, lost 2,000 jobs from November 1984 to May 1985.

### Need for 'high-flex' workers

One of the emerging issues identified by the Congressional Clearinghouse on the Future, a support group for lawmakers, is the need for "high-flex" workers. "As our economy becomes more heavily based on services and high-tech industries and less on traditional manufacturing, a substantial portion of today's workers are facing joblessness because they possess outmoded skills," a clearinghouse briefing paper said.

"New developments in technology and increased international competition have created a growing need for a flexible work force characterized by trained and versatile workers," the clearinghouse continued.

In the computer industry, 73% of all retraining programs help employees deal with computer technologies that are being introduced into their jobs, according to William F. Hanahan, director of technology issues for the Computer and Business Equipment Manufacturers Association.

Existing federal programs are reaching only a small portion of the displaced workers who need educational and financial assistance, the OTA report said.

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## Soviets possess access to Western data bases

### Reagan administration expresses its dismay

By Mitch Betts

WASHINGTON, D.C. — The Soviet Union has an active program to gain access to on-line data bases in Europe and North America for the purpose of obtaining scientific, business and political information — much to the dismay of the Reagan administration, according to researchers and government officials.

The Soviet effort upsets the Reagan administration because it gives the Soviets easy access to Western technological research and business information that can be put to use for military or economic advantage, according to U.S. Department of Defense officials.

The Soviet program was publicly confirmed by Oleg L. Smirnov, head of the Soviet Union's National Center for Automated Data Exchanges (NCADE), at a Rome meeting on transborder data flows, according to a report by the Transnational Data Reporting Service, Inc. (TDRS). NCADE is part of Moscow's Institute of Automated Systems.

Smirnov said NCADE uses data networks in France, Canada, the UK and elsewhere to access indirectly commercial data banks, TDRS reported in the latest issue of its journal, *Transnational Data and Communi-*

#### *cations Report.*

"Through the NCADE, foreign data banks on science, business, politics, ecology and agriculture are available, which makes it possible to obtain information for scientific research," according to the Smirnov report. The center also trains Soviet experts in how to use on-line data bases, the report added.

Prime users of NCADE's services include the Soviet Academy of Sciences and the All-Union Institute for Scientific and Technical Information, the Smirnov report said.

Besides this program based in the Soviet Union, "It's a relatively straightforward thing for Soviet researchers working at scientific institutes in Europe, say Vienna, to get access to American data bases," according to James Townsend, a researcher at Georgetown University's Center for Strategic and International Studies.

Indeed, in 1982 the Reagan administration halted U.S. participation in the Vienna-based Institute of Applied System Analysis to protest Soviet use of the institute's computer facilities to access unclassified U.S. data bases, TDRS reported.

At a congressional hearing last year, Walter G. Dealey, a deputy director of the National Security Agency, expressed outrage that the Soviet Union has on-line access to U.S. data bases and that some foreign countries intercept U.S. corporate communica-

nations, enabling them to exploit the information at the expense of U.S. economic interests.

Dealey made the remarks in defense of President Reagan's 1984 national security directive that gives the government authority to protect data bases that contain "sensitive, but unclassified, government or government-oriented information" whose disclosure or loss could harm national security [CW, July 8].

#### Data bases 'fertile ground' for Soviets

Likewise, U.S. Secretary of Defense Caspar W. Weinberger issued a report last fall asserting that data bases are "fertile ground" for Soviet intelligence agents seeking Western research for use in designing Soviet military equipment [CW, Sept. 30].

Weinberger said one solution would be to remove all sensitive entries from the data bases or limit their availability to allies, but he acknowledged that this might also inhibit research by U.S. scientists.

Kenneth B. Allen, vice-president of government relations for the Information Industry Association, said the association of data base vendors is aware of the security concerns but would strongly resist any government effort to regulate the content or flow of unclassified information. He said the association has not yet taken a position on how to balance the need for security and the need for information access.

## Guidelines to limit sensitive information

By Bryan Wilkins

WASHINGTON, D.C. — Prompted by the U.S. Department of Defense, the Reagan administration has issued new policy guidelines spelling out rules that limit publication of technical information relating to computers and electronics. At the same time, the administration is moving to limit sharply the access of Soviet scholars to supercomputers in the U.S.

The DOD policy guidelines governing publication of technical data affect experimental research programs performed on campuses and under government contract by the private sector. The research can be non-defense related. Last year a dispute erupted between the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and the DOD concerning government efforts to control its employees' participation in scientific and technical societies as well as limiting the release of information.

Last week, the IEEE reported that it believes it has succeeded in obtaining relaxation of policy guidelines by the DOD so that "incidents involving last-minute censorship of papers may be rarer."

See DOD page 15

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## NEWS

## DOD from page 14

The DOD policy will set a limit of 10 to 30 working days on DOD reviews of technical papers that are generated as a by-product of government sponsored research and that are presented at conferences. The policy guidelines establish consultation procedures between the DOD and conference sponsors and spell out the DOD's review of the papers and its power to make changes. That power extends over papers that do not come under DOD sponsorship.

The new policy of placing an outright ban on access to supercomputers by scholars from the Soviet bloc has been the subject of intense negotiations with the National Sci-

ence Foundation and U.S. universities. The policy has been pushed by the DOD and national security officials who fear that Soviet use of supercomputers will aid its efforts to design weapons and break communications codes.

DOD concerns were prompted by a nationwide push to open access by computer programmers and engineers to supercomputers across the country in an effort to widen computer literacy.

The National Science Foundation has been put in charge of a \$200 million federally sponsored program to promote supercomputer access by establishing four centers on university campuses.

## Computer Memories' losses increase

CHATSWORTH, Calif. — Losses continue to balloon at troubled disk drive manufacturer Computer Memories, Inc. (CMI), which announced a \$21 million loss, or \$1.92 per share, for the third quarter ended Dec. 31.

CMI revenue plummeted more than \$17 million in the third quarter after IBM stopped using CMI drives in the enhanced version of its Personal Computer AT. Sales to IBM accounted for approximately 80% of CMI's business.

Since December, CMI sold its Singapore facility, subleased two of its four Chatsworth buildings and cut its work force by 30%. Further consolidation is expected, and the company

said it plans to convert the majority of its assets to cash.

Earlier this month, CMI reached a \$6 million agreement with Quantum Corp. of Milpitas, Calif., in regard to alleged patent infringements concerning Quantum's Q2000 disk drive. In addition to the \$6 million settlement, CMI agreed to discontinue manufacturing its CM6000 drive next month.

CMI losses for the same period a year before were \$8.8 million. According to the company, losses for the nine months ending Dec. 31 totaled \$13.7 million, compared with \$6.4 million a year earlier.

— Maura McEnaney

## Federal office delays study on pregnancy risks of VDT use

By Mitch Betts

A long-awaited study by the National Institute for Occupational Safety and Health (NIOSH) on the pregnancy risks of VDT use has been delayed by the White House Office of Management and Budget (OMB) and may not get under way until this summer, more than two years after it was announced.

Dr. Teresa Schnorr, the NIOSH epidemiologist in charge of the study, said that the OMB rejected the NIOSH proposal claiming design flaws, but NIOSH plans to resubmit the research proposal. She said a response is likely in June or July.

The study was designed to interview 2,000 married women who use VDTs full time — such as telephone operators — and compare their pregnancies with 2,000 married women who have similar jobs but do not use VDTs. The study will measure whether VDT users have more abnormal pregnancy outcomes than non-users [CW, Jan. 14, 1985].

Schnorr said the study already has been delayed by the difficulty of finding a control group of employees who do not use VDTs, a problem that gets worse with further delay.

As Congress' Office of Technology Assessment recently observed, "The major dilemma facing public health officials is that by the time the popu-

lation of VDT users has worked long enough to manifest chronic outcomes, there will be few people to use as controls, since most office workers will be working at the VDT."

Interest in the VDT health controversy was heightened by a preliminary Swedish study showing that VDT-like radiation could affect mice fetuses [CW, Feb. 17, 1986]. However, a subsequent statement by Sweden's National Board of Occupational Safety and Health said that further analysis of all of the tested fetuses "does not suggest any damaging effect."

Some parties in the VDT debate say they hope the study will settle the issue of whether VDT use causes miscarriages and birth defects, but others say that there will always be calls for more research. A report by the U.S. House of Representatives' Subcommittee on Health and Safety [CW, Sept. 16] said the study "is vital and its results could have far-reaching effects in reducing the fears of pregnant women using VDTs."

The OMB rejected the NIOSH study proposal on technical grounds. For example, the OMB said the sample should be limited to women who intend to get pregnant, but Schnorr said that intent is too subjective, so NIOSH plans to stick with a larger sample of married women in their fertile years.

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# VIEWPOINT

## EDITORIAL

### Old tasks, new tactics

One of the myths most beloved by managers within the technology community is that of the "happy employee." Any work associated generally with high technology and specifically with computers is white-collar work that offers challenges and satisfaction, provides more than adequate compensation and takes place in a pleasant environment. No shop floors here, no sweatshops, no union stewards.

As with any myth, this one contains a kernel of truth: Many computer-related jobs are better than your average office or factory job. Others, like data entry, may not be. In this week's page one "CW Exclusive," we examine the world of data entry and find that data processing managers face the same problems as do managers in any other setting where employees are paid low wages to perform routine, repetitive tasks quickly and accurately.

Where unemployment is high and jobs are scarce, managers can fill data entry slots — even if the new hires are not as energetic and motivated as the managers might like. Where jobs are more plentiful, managers find that potential hires will even choose counter work in a fast-food joint over the unvaried, sedentary routine of keying in data.

Welcome to the wonderful world of modern management. Because they worked in a booming profession largely immune to the vicissitudes of the general business economy, many MIS managers have not been directly confronted with some of the challenges facing their corporate brethren. Those times are changing.

Several weeks ago, we reported the story of how DP shops are beginning to receive staff-cut edicts for the first time. And now, there is a paucity of applicants for entry-level positions that don't promise quick routes to the top.

In response, and to their substantial credit, a handful of MIS managers are adopting innovative tactics that have proven effective in hiring, retaining and motivating data entry personnel. They are providing adequate training, above-average compensation for above-average work and well-designed work spaces that bring light and comfort to what had often been a sweatshop environment.

When the nature of the work allows it, they are abandoning the assembly-line notion of data entry — one operator performing one task all day long — and instead, creating jobs that include a variety of support tasks, only one of which is data entry.

This is worth noting not only because such solutions may solve the short-term need for DP personnel but also because it is putting the spotlight of management excellence on MIS. If future top management prospects are to emerge from the ranks of DP/MIS — never before considered a forest of executive timber — it will be in large part because of the creative and efficient handling of such managerial challenges.

With such solutions, managers are demonstrating their executive skills by recognizing employees' human needs. The managers are sending a direct message to data entry staff that their contributions are important to the overall success of the operation. That is an important message and evinces the kind of enlightened management required within today's data processing environment.



## LETTERS TO THE EDITOR

### Ada is more than meets the eye

I was surprised and shocked by the article "The myth of Ada as Esperanto" [CW, Jan. 20]. I do not think an objective analysis of the development and use of Ada was presented.

The first thing that needs to be said is that the Ada language is only one component of what is called Ada. Ada defines an environment under which programs are developed, maintained and used. Tools like language-sensitive editors, data bases for the management of software development and maintenance are an integral part of Ada.

This environment is defined by the specifications of the Kernel Ada Programming Support Environment and Minimal Ada Programming Support Environment. It is true that right now only Ada language compilers are available, but this situation will change rapidly. Therefore, discussing only the Ada language and omitting the environment is misleading.

The article said that Ada does not really provide portability. It also said that portability should be obtained through hardware. A quick look at the history of computer technology demonstrates that this assertion is wrong. The computer industry, for major marketing reasons, will never go toward product standardization.

Currently, it takes more time to establish a hardware standard than to develop the next technological generation. Only software standards can achieve portability because the life cycle of software technology is much longer.

Just look at Fortran and Unix. Fortran as a language and Unix as an operating system have both achieved a tremendous level of portability. They have given thousands of people the ability to use computers in a crude, but effective, way. I do not think that any hardware innovation could have achieved this.

In this context, the definition of the Ada language goes even further. Real-time processing, tasking, parallel processing, exception handling, software packaging and dynamic memory allocation are integral parts of Ada.

What was once to be designed and implemented for each specific environment can now be developed once. True portability is achieved when a programmer does not have to know on which machines the program is to be executed, no matter what the program does. Ada provides this feature at the highest level.

In addition, Ada is a true standard in that a

compiler has to go through a thorough evaluation and validation before it can be called an Ada compiler. And we can be sure that the U.S. Department of Defense will enforce this policy very strictly. This, in turn, provides another level of portability.

Unlike Unix, for which there are almost as many versions as there are users, there is only one valid specification of Ada. All these factors give the assurance that programs developed in Ada in one environment can be compiled and also executed in another. If this is not portability, what is?

The article said that Ada is a language for scientists. Nothing could be more wrong. Ada is not a language for scientists; Ada is a language for software engineers.

Software engineers use techniques of software engineering to solve problems in various areas including, but not limited to, sciences. One of the objectives of the design of Ada was to make it usable in a large range of applications.

Try to explain what makes Ada a language for scientists more than C, Pascal, PL/I, Basic and so on. Ada is a general-purpose language designed to be the primary tool of software engineers. Ada was not designed to be front end to computers; instead, it was designed to build and maintain those front ends in a reliable manner.

The comment that there is little chance that commercial applications will follow military applications shows a lack of foresight. At a time when hundreds of companies are going to be involved in a gigantic military project like the Strategic Defense Initiative, all of them needing to switch to Ada for software development at some stage, it is unthinkable that the companies making this investment will not try to feed the technology back to the commercial field.

From a cost-effectiveness standpoint, this seems obvious. As additional government agencies like the National Aeronautics and Space Administration and the Federal Aviation Administration adopt Ada as their software standard interface, it seems clear that the Ada community cannot help but grow rapidly.

Ada is a complex but powerful language. The way to use it, as well as teach it, is not yet known, but this will come with time. The techniques of software engineering will be widely spread when Ada reaches maturity.

**Philippe Collard**  
Principal programmer  
Department of Radiological Sciences  
University of California at Los Angeles

# WEEKLY.

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# VIEWPOINT

## Dollar down, yen up, higher prices ahead

By CHARLES P. LECHT

**T**he U.S. dollar dove from more than 250 Japanese yen to around 180 yen during the past nine months. "So what?" you may ask. However, what is happening to the good old U.S. buck in Tokyo today has great bearing on what you may be able to buy with it tomorrow.

Japan, home of the yen, is the country that supplies the U.S. with most of its imported technology. Today's devaluation of the dollar against the yen cannot help but affect just how far your dollars may be stretched through the rest of 1986 and thereafter.

For one thing, Japan's exports are going to be far more expensive. If what is happening in the automotive industry happens in the computer industry, your buying power will shrink 25% or more. Thus, the benefits of technology advances — which have the potential to yield as much as 25% more bang for the buck each year — actually yield change alone.

Japan's Ministry of International Trade and Industry (MITI) recently released a report that confirmed this conclusion. MITI noted that a survey of 12 major Japanese semiconductor manufacturers showed that they had cut their capital spending by 33% from last year.

Although this is attributed to a slackening of demand resulting from

sluggish personal computer sales in the U.S. and elsewhere, we cannot help but wonder if the dollar's devaluation might have had a smidgen to do with it. Forced to raise prices because of a sudden inflation of their currency, Japanese chip makers could hardly be expected to do anything but cut back to remain afloat.

Semiconductors have been called the "oil" of our next industrial revolution. Like oil, the more product, the less inexpensive it is; the less product, the more expensive it is. If semiconductor production falls under the control of a few companies that cooperate in an OPEC-like cartel, products get even more expensive. If Japan's semiconductor industry is unable to remain competitive, we can expect a rise in the price of our computer systems.

The MITI report was issued at exactly the same time that Japan recorded the largest January trade surplus ever. Stated in dollars, exports in computer systems technology rose a whopping 58.3% over last year, even though exports of semiconductors dove 35.3%. This resulted from a marked increase of computer systems exports to the U.S. and other places, MITI reported.

Now put it all together: Part of the value of the increase can be attributed to the rising value of the yen. Let's say half. What about the other half? It reflects an increase in production

in Japan by U.S. and European companies. The production figures of these companies are not disclosed in the report.

But it doesn't take too much imagination to conclude that any profit-oriented enterprise worth its salt would seek to increase its assets in Japan while the grand dollar devaluation against the yen was taking place. Why? The value of its assets would rise along with the yen.

In the case of U.S. companies whose consolidated results are reported in dollars, this has a direct bearing on the values of their traded stocks. The fact that the market has been delivering one record-breaking day after

another this winter may be traced to this.

Although they are bombarded with balance of trade statistics that support protectionism, few Americans know that the Japanese export figures include the production results of non-Japanese-owned but Japan-based manufacturers as well as the Japanese-owned facilities manufacturing for our home team. This cannot help but reinforce the belief that our home industry is being victimized by Japanese companies and that this is at the root of our trade deficits problem with Japan.

What we seem painfully aware of is that there's hardly a European or U.S. computer hardware product that doesn't have a Japanese component

or two in it. Many are entirely made in Japan.

We sometimes seem hard-pressed to explain why we cannot help but buy the issue of Japanese-based — not necessarily Japanese-owned — companies in the face of available homemade alternatives. The truth is, however, that homemade alternatives aren't all that available any longer.

Now, we cannot fault those U.S. companies that foresaw the benefits of moving part, if not all, of their assets to Japan before today's devaluation of the dollar to reap the rewards that it might bring. Nor, can we fault those European and U.S. companies that seek to use the moment to neutralize their Japanese competition, while it reeks from the effects of the current evaluation of the yen against the dollar and faces inventories it can no longer sell without taking staggering losses. After all, that's what competition is all about.

And, it is only human nature that compels our leaders in Washington, D.C., to seek to overcome our trade deficits problem by redefining the value of our currency. But, let's not kid ourselves into believing that the short-term gains we will realize from all of this will have any long-term benefits.

For when the devaluation ends and the tide turns so that Americans will find it expedient to bring their computer industry home while searching for alternative supply sources abroad, someone will have to cough up the cash to pay for this 1986 occurrence. No doubt this will come from the U.S. computer systems purchasing community in the form of significant price increases.

### LECHT ON SCIENCE

**Semiconductors  
have been called the  
'oil' of our next  
industrial  
revolution.**

**Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer and communications technologies. He divides his time between Tokyo and New York.**

## Office automation: effectiveness vs. efficiency

By RICHARD HERSCHEL

**A**fter many years of office systems lease, rental and maintenance payments as well as the costs of system upgrades and training, it is disturbing to find that the initial management question of "What will I get for this equipment investment?" has been replaced by "What am I getting for this equipment investment?" It appears that the jury — end-user management — is frequently unclear as to the benefits of office automation.

How did this happen? The investment of time, money and personnel in this equipment has been justified on the promise of improved productivity.

The reason for end-user ambiguity may be criteria for success that are either improperly defined or undefined.

Establishing criteria for success should be a part of the project planning process in which user manage-

ment defines what benefit needs to occur to justify the potential cost of the office automation equipment.

What is critical in this definition is that the desired benefit is defined by user management, not MIS. This allows MIS analysts to assess meaningful productivity and opportunity goals that can be measured and understood by the client. It also inhibits the adverse influence of information services' own success factors, which may or may not have anything to do with the realization of a user's needs.

A key method for defining success criteria of office automation is to differentiate between effectiveness values and efficiency values. Definition of these values provides the necessary framework from which meaningful analysis can then be performed.

Effectiveness values need not, and probably should not, have a dollar value assigned to them because they are often a guess at best. They may be the wrong measure of the benefit, or they may cloud the real value of productivity gains.

Effectiveness values should be measured, however. They can and

should be measured and described in terms that articulate the meaning and benefit to the client.

For example, a public relations executive for a large corporation might ask that an office automation study be done for his department. Suppose the individual defines his problem as a need to improve the turnaround time of press releases so that the corporate image may be better served.

This is an effectiveness problem.

It has nothing to do with the opportunity to yield a tangible dollar benefit per se. Although there are certain efficiency aspects to this problem, measurement as an efficiency value would misrepresent the opportunity — which is to maintain the corporate image better by presenting responses in a more timely manner.

Efficiency values have gotten off people in trouble in the past. It was true that word processing machines could save keystrokes, but then management began to question the inherent value of such time savings. After years of equipment payments, people can probably accept this benefit, but they may not see it as reason to upgrade equipment today.

Efficiency values are important when defined properly. They are improvements to processes such that reductions in something are realized, and these reductions have in and of themselves some tangible and desired value to user management. Efficiency values translate to some quantity: dollars, hours, temporary help, keystrokes.

Success criteria can provide an important means to improving relations between the end user and MIS management.

MIS needs to demonstrate better that it understands how to use technology as a means for providing improved effectiveness. Users must take charge of their information needs and define criteria for success, in addition to defining their problems.

Finally, MIS and end users should be held accountable for project recommendations. Periodic department reviews to demonstrate that success criteria are being realized will help both groups to fine-tune their analytical skills.

Thorough documentation of intended results will help to ensure that the correct measure of benefit is applied, either in effectiveness values or in efficiency values.

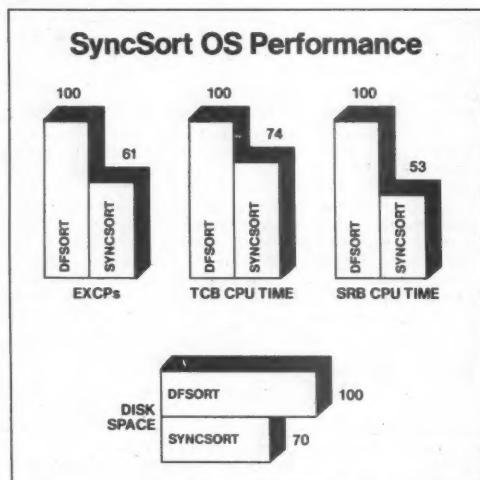
**Herschel is president of Princeton Productivity Group, Inc., a Princeton, N.J.-based management consulting firm specializing in office automation development.**

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# SOFTWARE & SERVICES



**SOFTALK**  
John Gallant

## Life cycles of software

In a very real sense, software products are like people.

After making their way into the world, products, like children, begin to mature. With the help of vendor parents — responsible vendor parents, that is — products continually develop and adapt to the realities of a cold, cruel world. A product that may not at first have been a strong contender can grow into a solid performer over time. In certain functional circles, products gain prominence based on their capabilities. And, as with most living things, a product's usefulness begins to wane as users' needs outgrow the software. It becomes obsolete and fades quietly.

If you find all of that difficult to swallow, keep an eye on IBM's DB2 and IMS Full Function products, each of which seems to be at a different stage in its life cycle.

The recent unveiling of Release 2 of DB2 represents a milestone in the maturation of the relational data base management system, similar to the penciling in of a new, higher line on a child's growth chart. DB2 is growing into a more sophisticated, worldly product that addresses the needs of a wider range of users and applications.

As software products go, DB2's birth was marked by great fanfare. Clearly, much of IBM's future DBMS success rests on the shoulders of the fledgling relational system. In the three years since DB2 came into the world, it has been criticized, perhaps unfairly, for failing to live up to its vast promise immediately.

See LIFE page 24

Gallant is Computerworld's senior editor, software & services.

## SAS stresses user requests, input in product development process

By James A. Martin

Because the software market is so mercurial, SAS Institute, Inc. President James Goodnight says he is more inclined to heed SAS users than industry trends when determining the direction the company and its products will take.

"We are fully committed to developing Version 6 of our software system, and that will take at least two years," Goodnight told *Computerworld* during the 11th annual SAS Users Group International (SUGI) conference held in Atlanta recently. "That doesn't leave much time for moving into new markets and supporting new machines. But it's the process you have to go through to

completely update and enhance the software for the next generation."

The Cary, N.C.-based company has "no great strategy changes" in store and "no great foresight about the market," Goodnight allows. "We just want to do what our users want." SAS taps reaction to existing products and cultivates ideas for enhancements with an annual users' poll and comments collected from SUGI.

Version 6 of the SAS system will be "more user-friendly, with advanced interactivity, windowing, subsystems and a macro language," Goodnight says. Version 5 consists of Base SAS, a foundation package for

See SAS page 22

## Software spending to rise

### Input report predicts 25% growth rate into 1990

By John Gallant

Despite a slowdown in 1985, spending on software is expected to grow at roughly 25% a year for the remainder of the decade, according to a recent Input, Inc. study.

In its report, "U.S. Software Products Markets: 1985-1990," the Mountain View, Calif.-based market research firm predicted that software products will be the fastest growing segment of the information services marketplace through 1990. Input said software spending will increase at an annual rate of 25% from a base of \$13.3 billion last year to more than \$41 billion in 1990.

Input's research showed the software products portion to be growing significantly faster than other segments of the information services market, including processing and professional services and turnkey sys-

tems sales. Expenditures on processing and professional services are expected to grow at an annual rate of 16% and 20%, respectively, while sales of turnkey systems will grow at about 19% through 1990.

The study also confirmed what many industry analysts had been predicting — that 1985 was a year of slower growth for the software industry. Software expenditures last year rose by just 20% over 1984 levels. In 1984, expenditures increased 34% over the previous year. Input predicted that renewed sales vigor beginning in middle to late 1986 will bring expenditure growth for 1986 to 28%, compared with 1985 levels.

The Input report cited four primary factors that slowed software spending last year. They included the condition of the economy as a whole, which led to budgetary restraint; user confusion arising from increasing competition and a flood of new products; user fears about software reliability in the wake of highly publicized product failures; and lengthy installations

See REPORT page 23

### NEW THIS WEEK

- IBM upgrades MVS/XA
- Network Research Corp. ports Fusion to Microvax II

■ For more on these and other new products, see pp. 73-95.

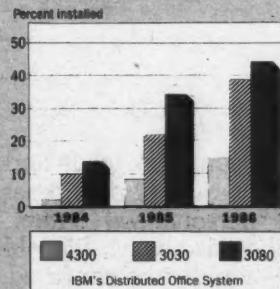
### INSTANT ANALYSIS

*"I don't believe many people are buying PCs to make them multiuser workstations, unless in an extremely small shop that can't afford to buy more than a few PCs. Microcomputers have become so inexpensive that users want the power all to themselves. The idea of cutting up that resource among several people just doesn't make a lot of sense."*

— James Goodnight, president of SAS Institute, Inc., on the evolution of multiuser micros

### DATA VIEW

#### Percentage of IBM mainframe sites running Disoss, 1984-86



Source: International Data Corp.

### SOFTWARE NOTES

#### U.S. standard for Cobol expected

The U.S. Department of Commerce is expected to issue soon its updated Federal Information Processing Standard (FIPS) regarding the Cobol language, according to American National Standards Institute Cobol Committee members attending the group's February meeting in Phoenix. The upgraded Cobol FIPS will mandate that manufacturers supply Cobol 85-compatible compilers if they wish to sell hardware to the U.S. government. Vendors will have 18 months to comply once the FIPS is published in the *Federal Register*.

Software AG of North America, Inc. has restructured the price of its Digital

See NOTES page 23

but not both, said IBM and United spokesmen.

The Enterprise package will interface with Apollo and other reservations systems through a communications controller using the well established Airline Language Code (ALC) network protocol, said Paul J. Mercurio, commercial market manager for the Apollo system. In addition to United's Apollo and American Airlines' Saber, the reservation systems at Trans World Airlines, Delta Air Lines and Eastern Airlines utilize the ALC network protocol.

United is seeking proposals from manufacturers on the controller hardware but has not yet selected a supplier, Mercurio said. The new system will be available late next summer.

See FRIENDLY page 22

## Friendly skies become bluer

### IBM, United develop travel agency system

By Charles Babcock

NEW YORK — United Airlines and IBM have announced a travel agency system, based on relational data base management system technology, that allows users to tap into information in airline ticket reservation systems.

The system, dubbed Enterprise, will allow users to extract airline, hotel, car rental and other data from United's Apollo system data bases. In addition, Enterprise will handle routine office functions such as payroll and accounts receivable. Existing travel agency systems provide ticket reservations or office management,

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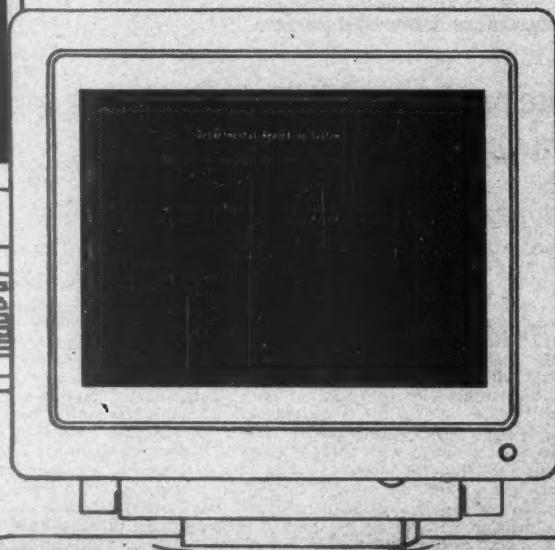
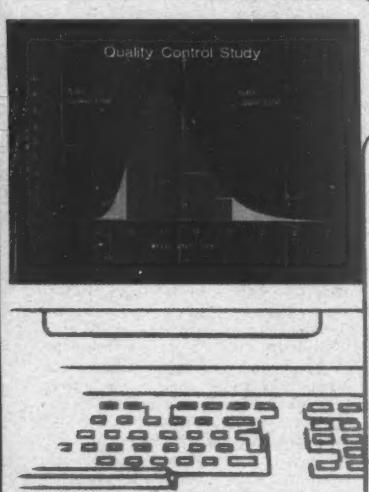
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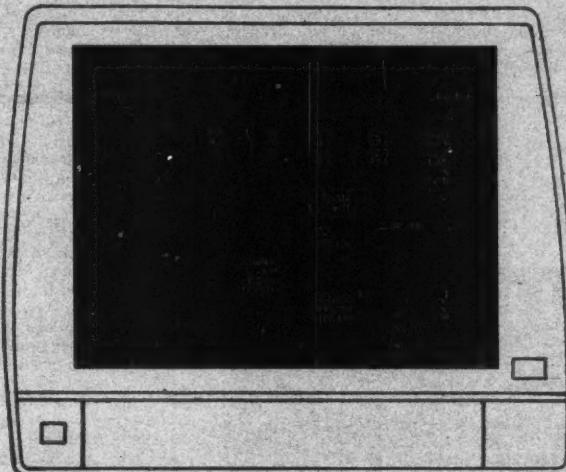
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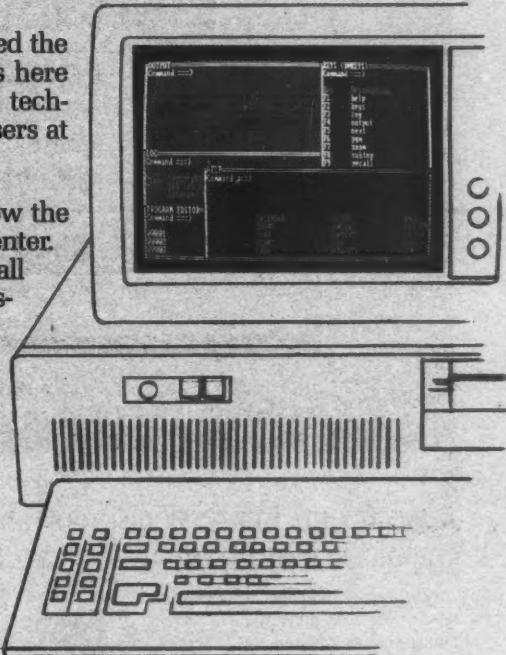
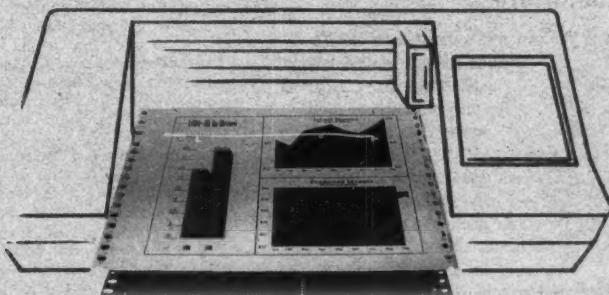
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## SOFTWARE &amp; SERVICES

## Notes: IBM sets up support center

From page 19

**Equipment Corp.** VAX/VMS products, **Adabas** (VMS) and **Natural** (VMS). The products were available, as a package, for between \$65,000 and \$85,000 for a perpetual lease. Now users can lease them annually for between \$12,000 and \$50,000 for the first year, depending on VAX model, and between \$7,000 and \$28,000 each subsequent year. Additional copies are discounted. Officials of the **Reston, Va.**-based systems software company said other VMS-based products to be released this year — versions of Software AG's mainframe **Predict**, **Super Natural**,

**Net-Work** and **Natural Security** [CW Feb. 17] — will also be available on an annual lease basis.

Along with the introduction of its **VM/SP End User Software Support System** [VM/SP ES3] — a package that offers users a VM/Entry or VM/SP base combined with other business, office and scientific/engineering applications — IBM recently established the **VM/Remote System Programming Support Center** to aid users of the product. IBM said the support offering will provide VM/SP ES (3) users with "systems programmer skills necessary to install, maintain and use" the package on IBM 4300 processors. Combining three IBM communications packages to provide computer-to-computer communications between the customer's processor and the support center,

IBM representatives will assist in system configuration, problem diagnosis, systems administration and application of corrective fixes.

**Infodata Systems, Inc.** of Pittsford, N.Y., and **King of Prussia, Pa.**-based **Soft-Switch, Inc.** have merged the technologies of Infodata's **Inquire/Text** data base management system and Soft-Switch's document translation systems. The **Inquire/Text Office Systems Interface** reportedly will support the transfer of documents from IBM and non-IBM workstations to the **Inquire/Text DBMS**. The documents may originate from a variety of word processing packages.

The interface will be available this spring to Infodata users for \$25,000 plus the cost of each required translation module.

**Software Productivity Research, Inc.**, the **Acton, Mass.**-based company founded by productivity guru **T. Capers Jones**, has developed a package aimed at helping users predict software development costs. The **Software Productivity, Quality and Reliability 20** (SPQR 20) system, according to Jones, combines artificial intelligence techniques with a data base of information on more than 8,000 development projects. Operating on an **IBM Personal Computer**, SPQR 20 can estimate costs from the planning phase through five years of maintenance and can predict a system's source code size in any of 30 programming languages. The first 3 copies cost \$5,000 each; additional copies are discounted.

**Lexington, Mass.**-based Distribu-  
See **NOTES** page 24

## Report: Software spending to rise

From page 19

of complex software systems, which delayed add-on software purchases.

Those hindrances to growth will be offset through 1990 by what Input labeled "major driving forces stimulating the software market," including the following:

- Long-term growth of the installed hardware base. Input predicted there will be 3.2 million mainframes and minicomputers as well as 20 million microcomputers installed by 1990.

- Technology and price/performance improvements. Improvements in such areas as networking, the study said, will stimulate the sale of new distributed software. Much of the software currently available will be made obsolete by evolving hardware technologies, creating new sales opportunities.

- Increasing emphasis on standardization. Standardization in such areas as communications protocols will widen the market into which vendors can sell their products.

Input said spending on mainframe and minicomputer software accounted for about 80% of the overall software products market. That portion is expected to enjoy approximately 23% growth annually through 1990. The company also estimated that mainframe and mini software prices will rise by about 4% over the next two years. Micro software expenditures will grow at about 32% annually for the rest of the decade, due primarily to the increasing installed base, the report said.

Expenditures on systems software and applications software will increase at about 25% annually, Input said. Within the systems software portion of the overall package market, sales of applications development tools will grow most rapidly, at approximately 30% annually. Expenditures for vertical market applications for such industries as banking and finance and discrete manufacturing will increase by 32% a year, compared with 19% growth for sales of cross-industry applications.

Input predicted that software firms affiliated with larger, non-software companies will increase market share at the expense of software-only vendors.

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## SOFTWARE &amp; SERVICES

## Notes: Pansophic buys Ingot line

From page 23

**tion Management Systems, Inc.**, a vendor of logistics and warehouse management software, has entered an agreement to assist IBM in the marketing of the IBM System/88 fault-tolerant computer. The processor will be packaged with Distributed Management Systems' Impact/DCM software and marketed as a distributed warehouse management system.

**Pansophic Systems, Inc.** of Oak Brook, Ill., completed its acquisition of Schonfeld & Associates, Inc.'s Ingot line of decision support tools. Pansophic excercised the option it

won to acquire the Ingot line in its July joint marketing and financial agreement with Schonfeld & Associates.

**Uccel Corp.** sold its UCC-Ten Data Dictionary/Manager product to Dsims Corp. of Dallas. One of the developers of UCC-Ten, Keith Watkins, is president of Dsims. Terms of the sale were not released.

**Adpac Computing Languages Corp.** of San Francisco entered into an agent agreement with K. K. Ashisuto, reported to be the largest Japanese distributor of U.S. software products. The Tokyo-based Adpac will market Adpac's PM/SS maintenance and systems development tool for mainframes.

**Access Technology, Inc.** released

a version of its 20/20 integrated spreadsheet system for Sun Microsystems, Inc.'s workstation series. South Natick, Mass.-based Access will sell the Sun implementation for between \$950 and \$1,200.

**San Diego-based Celerity Computing** unveiled discounts on its superminicomputer systems for software developers who want to develop applications for or port existing systems to Celerity's Unix-based processors. Under the Software Developer System Program, developers can take advantage of a 45% discount on a special multiuser development system. The dual-processor configuration of the 32-bit Unix system with software development tools will be sold for less than \$80,000.

## Life cycles of software

From page 19

But the relational systems with which DB2 is constantly compared — those with the active data dictionaries, the fourth-generation languages, the superior performance — have had much more time to mature, to develop into the fairly integrated development environments they are today. In one sense, to compare DB2 with a Cullinet Software, Inc. IDMS/R or an Applied Data Research, Inc. Datacom/DB is akin to comparing a high-school basketball star with Larry Bird.

Give DB2 a few years. As its performance gradually improves and as IBM or other vendors supply productivity tools, DB2 no doubt will evolve into a very solid performer. DB2 is an adolescent poised on the brink of adulthood.

IMS Full Function is another story. Despite IBM's assertions to the

“”

**IMS Full Function is like the middle-aged man who feels the first pangs of heart pain and contemplates his own mortality.**

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contrary, it appears evident that IMS Full Function will become less and less important a product as DB2 matures. Analysts agree that, as DB2 improves to handle a wider range of applications, IMS Full Function will be phased out slowly. IMS Full Function is like the middle-aged man who feels the first pangs of heart pain and contemplates his own mortality.

IBM is not going to drop Full Function anytime soon. DB2 still has a lot of growing up to do to live up to the performance and reliability reputation of its older brother. Also, too many users have too many dollars invested in IMS-based systems for IBM to move too rapidly in trimming its DBMS stable. IBM will continue to support and improve Full Function, even if the company does not market it as actively.

But, analysts concur, it is clearly to IBM's advantage to step clear of its current dual-DBMS strategy. There will always be a minority of applications that require a transaction-oriented foundation such as IBM's IMS Fast Path or its Transactions Processing Facility. But there is no inherent reason DB2 cannot take on IMS Full Function's work load. As DB2 steps up to that task, buyer confusion over and resistance to the dual-DBMS approach will likely end.

The message contained in this parable is a simple one: Selection of a DBMS today is an important, strategic decision. When comparing competing products, users would do well to remember that software is not a static, fixed thing. Products grow, prosper, then fade. What looks right today may not be suitable tomorrow, and vice versa. Where a product is going, or growing, may be more important than where it is.

# COMMUNICATIONS



**DATA STREAM**  
Elisabeth Horwitt

## They're after your business

**P**icture a railroad company that has just finished laying thousands of miles of shiny new tracks — only to find that customers prefer to use their own trains and possibly their own tracks as well.

Right now, telecommunications companies are struggling to avoid just such a dilemma. The regional telephone companies and long-distance carriers such as U.S. Telecom and MCI Communications Corp. spent the last couple of years installing digital switches and fiber-optic cable — the track for high-speed, reliable, cost-effective digital networking.

The past few years also have seen the telecommunications industry spending significant amounts of time and money on the development and implementation of Integrated Services Digital Network (ISDN). The emerging digital communications standard promises users far more flexible and cost-effective access to digital networking facilities and services.

These efforts should be appreciated by Fortune 1,000 corporations for whom data communications networks are a high strategic priority. The next few years should see a healthy, growing demand for wide-area networking channels.

Unfortunately for the vendors, the bandwidth leasing business offers small profit margins. The carriers expect their major revenues to come from value-added network services — the freight cars that run on network lines. They want corporate customers to hand over most of the responsibility

See **THEY'RE** page 30

*Horwitt is Computerworld's senior editor, communications.*

## Computer link uses ac wire

### Gridcomm claims savings solution to static problems

By Elisabeth Horwitt

DANBURY, Conn. — A recent breakthrough in local-area networking technology was introduced last week by Gridcomm, Inc. Gridnet permits microcomputers from IBM, Apple Computer, Inc., Tandy Corp. and Compaq Computer Corp. to share peripheral resources over ordinary ac wiring.

According to Gridcomm President Kenneth A. Lewis, Gridnet requires no special cabling, so the cost per node is about 25% that of other networks.

Christopher Roser, senior associate at Wall Street research house Equity Research Association, said he was very impressed by the cost savings the product offers and by its multivendor support. "If the technology is viable, Gridnet should be a real winner. The crucial question is whether the system works under demand-

ing conditions. For instance, we work in a Manhattan office building that has crazy static on the ac lines. Can they screen that out and transmit pure, clean, error-free data? That's been a critical network issue for years."

Lewis claimed that static is not even an issue for Gridnet because the system transmits on a high radio frequency band that is totally separate from ac voltage frequencies.

Standard networking features, including electronic mail and communications software, are built into the Gridnet GC-1400 network interface. Priced at \$549, the GC-1400 consists of a radio frequency transmitter that plugs into the wall outlet and an intelligent box that plugs into the computer's RS-232C or RS-422 port. The box includes a microprocessor with a real-time operating system and either 8K or 48K bytes of memory.

Gridnet electronic mail is broadcast over the ac wiring. Each GC-1400 picks up those packets addressed to its host and

See COMPUTER page 28

### INSIDE

Bank of New England chooses a flexible, multivendor local-area network strategy/26

### NEW THIS WEEK

- Interlink Computer Sciences offers IBM/DEC gateways
- AT&T launches an international Accunet packet server

■ For more on these and other new products, see pp. 73-95.

### INSTANT ANALYSIS

"The market for integrated local-area and wide-area networking is still not big enough to justify the development of diagnostic and management tools to handle both kinds of network."

— Scott Haugdahl, senior systems specialist, Architecture Technology Corp., during an interview

## Excelan introduces diagnostic tool to monitor local-area networks

By Elisabeth Horwitt

SAN JOSE, Calif. — Excelan, Inc. has introduced Lanalyzer EX 5000E, a hardware board and software combination that turns an IBM Personal Computer, Personal Computer XT, AT or compatible into a local-area network diagnostic tool. The product monitors and analyzes the performance and traffic patterns for any network that adheres to the IEEE 802.3 — Ethernet — standard.

The \$9,500 Lanalyzer, microcomputer not included, is a less expensive version of Excelan's Nutcracker, a 2-year-old local-area network analyzer priced at \$49,500. "The Nutcracker was designed for network developers. The Lanalyzer is for network managers that want to isolate problems and head off network capacity overloads before they get out of hand," said Excelan product manager Jay Weil.

The product retains much of its prede-

cessor's functionality, including the ability to do the following:

- Monitor and graphically represent data traffic generated over the entire network or by individual nodes.
- Track total number of packets sent and received by individual nodes for billing purposes and track frequency of bad packets in order to isolate trouble spots on the node level.
- Generate traffic in order to test network response time under different load conditions in terms of the size and frequency of packets transmitted.

"Excelan will probably sell a lot more of Lanalyzers than Nutcrackers," commented Scott Haugdahl, a senior systems specialist at the Minneapolis, Minn., research company Architecture Technology Corp. "The Lanalyzer is probably the most cost-effective network analyzer around right now

See EXCELAN page 28

## Mainframe links expected to make Apple more tempting

### Micro firm promises Macintosh connections

By Peggy Watt

CUPERTINO, Calif. — At the recent Macintosh Plus introduction, Apple Computer, Inc. Chairman and President John Sculley amended the microcomputer company's famous "one person, one computer" stance to a more open-ended philosophy of "one person, one computer, elegantly connected into the systems world."

Apple's new openness should provide some important product announcements in the next year or two. The vendor promises that the Macintosh will soon be speaking up to a

growing audience of minicomputers and mainframes.

In a white paper statement of future data communications directions released last year, Apple promised to provide links with the IBM communications environment, Systems Network Architecture (SNA), and the LU6.2 program-to-program interface. The microcomputer vendor also said it would support Document Interchange Architecture and Document Content Architecture protocols, which would enable Apple users to download and edit documents generated by IBM systems. Another of Apple's announced integration plans is Macintosh access to IBM's Distributed Office Support System library distribution services.

Other forthcoming Macintosh-to-IBM links from Apple include connectivity to IBM System/36 and 38 over twinaxial cable through a third-party vendor's IBM 5291 terminal emulation product.

"When we say we're going to be IBM compatible, we don't mean that we intend to ship PC-DOS machines," says Mike Homer, strategic sales technical manager. "We are talking about file compatibility and data compatibility between applications and operating systems that run on Apple computers and IBM computers." Apple has also promised to link Macintoshes with non-IBM hosts from Digital Equipment Corp. and Tandem Computers, Inc., although the microcomputer vendor will re-

lease neither details nor deadline dates.

Homer and other Macintosh developers say they hope to carry the advantages and ease of use of the Macintosh interface into its mainframe connections. The user should be able to differentiate between data from local and remote sources and ideally should be able to cut and paste among them, Homer says.

Most of Apple's promised connections are still in the development stage, however. So far, the vendor has shipped two Macintosh-to-IBM mainframe links. The Macterminal program, sold by Apple for \$125, enables the Macintosh to emulate an IBM 3278 Model 2 and DEC VT100. See MAINFRAME page 27

## COMMUNICATIONS

## Bank links stand-alone micros with multivendor local net

By Eddy Goldberg

BOSTON — End-user demand spurred a major Boston bank to evaluate a number of local-area networking products. As a result, the bank installed a multivendor communications system that not only meets current user needs but also remains flexible enough to accommodate future networking installations such as AT&T Information Systems' Starlan or IBM's Token-Ring network.

In early 1984 the Data Services and Corporate Systems departments at the Bank of New England began receiving requests for a means to share

files and peripherals from many of the bank's 200 to 250 personal computer users. Danielle Barr, vice-president of Corporate Systems, recalled, "We began looking for something that would tie the stand-alone personal computers in departments and work groups together."

In January 1985, the bank began to study the problem in earnest. A task group was jointly formed by the bank's Hardware and Communications department and Office Systems group, a part of Corporate Systems responsible for end-user computing.

A minicomputer-based solution was quickly ruled out. "We looked at the IBM System/36, but it would have required a complete conversion of all the personal computer users' applications. We didn't want to do that, so we began to look at local-area network solutions," Barr said.

The bank wanted a flexible networking solution that would permit future migration to IBM's then-unnounced token-passing network and the connection of departmental networks into one bankwide communications system. The bank's task group evaluated products in three areas: cabling, network interface cards and network servers.

The group began by choosing a cabling system — Type 2 shielded twisted-pair wiring as defined by IBM's Cabling System building wiring specification.

Next, different net configurations were examined. IBM's own PC Network could not be used because it required a broadband coaxial cable.

The first network evaluated was from Nestar Systems, Inc. Nestar was a top candidate because it is an established, proven network company, Barr explained. In addition, Nestar's network supports PC Focus, a data base query language from Information Builders, Inc. This would allow the bank's personal computer users to download Focus files from the bank's host computer and manipulate them locally, thus conserving mainframe resources.

### Nestar system a 'bear'

According to Barr, however, the Nestar system proved to be a "bear to keep up." Jonathan Oski, an Office Systems analyst responsible for network administration, had to spend as much as 80% of his time maintaining the 20-node pilot network.

The bank next looked at a network that consisted of components from three vendors. An IBM Personal Computer XT with expansion board acted as server. Novell, Inc. supplied the network software, and Proteon, Inc. supplied the token-passing network hardware, Pronet.

This system was both reliable and fast, according to Barr. But before the bank had completed its evaluation, a network server from Banyan Systems, Inc. arrived earlier than expected. Attempts to add this second server to the ring failed due to packet and address conflicts. The Banyan server was disconnected and the previous evaluation completed. The 80M-byte Banyan server was then tested with the Banyan operating system and the Pronet hardware.

See BANK page 27

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## COMMUNICATIONS

## Computer link uses ac wire

From page 25

lets the user know there is mail waiting by beeping and by putting a message on its LCD.

### Multivendor connectivity

Multivendor connectivity is another built-in GC-1400 feature. A proprietary conversion package from Gridcomm allows ASCII file exchange among microcomputers from a variety of vendors, including Apple, IBM, Tandy and Compaq.

Also standard is Xmodem, the public domain communications package that handles formatted file exchange between computers of the same type

using the same word processing package.

Lewis identified Gridnet's primary market as "the 14 million businesses with sales of \$10 million or less" and the smaller sites of Fortune 2,000 corporations. "We're not going after 100-node networks," he admitted.

Gridnet does not have the power to support large installations with complex data needs. The GC-1400 board can only address 32 nodes, of which only eight can be communicating at any one time.

While the network's 23K bit/sec. transmission rate may be adequate for transmitting electronic mail and short files, it is slow compared with the 1M to 2M bit/sec. data rate of most cable-based Ethernet systems.

The network's file server also has limitations. Any microcomputer can be designated as a server and can

make its files accessible to other network nodes — but only to one at a time. The rest must wait. More sophisticated network servers with multitasking operating systems can allow several users to access the same disk, or even file, concurrently.

Kim Myhre, a senior analyst at International Data Corp. in Framingham, Mass., expressed doubts as to whether Gridnet's cost savings give it enough advantage over products that follow standards like Ethernet "that have been kicked around for 10 years."

On the other hand, he proposed that "the ac wiring idea may really be a breakthrough" in the area of ease of installation.

### Gridnet competitors

Gridnet's nearest competitors are twisted-pair networks offered by

vendors like Fox Research, Inc. and 3Com Corp.

Myhre pointed out that installing twisted-pair networks is not as inexpensive and easy as it sounds: "You get electrical interference, and often you don't have wiring wherever you want to put a PC. Nine times out of 10, you have to rewire."

Gridcomm's other two network offerings are the GC-1100, a printer interface priced at \$449, and the GC-Zero, a \$799 Hayes Microcomputer Products, Inc.-compatible modem interface that enables Gridnet nodes to transmit data over the telephone system.

Users at remote sites can access network resources via the GC-Zero modem connection.

Gridnet products will be available in quantity in March. They will be sold through computer retail outlets.

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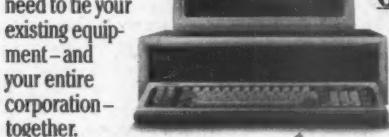
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WANG



## Excelan unveils diagnostic tool

From page 25

and fills a real user need. Plenty of network analysis products exist for the wide-area network market but very few for local networks."

DRN-1700 Lanscan, announced about a month ago by Communication Machinery Corp. of Santa Barbara, Calif., is probably the closest approximation to Lanalyzer currently on the market. It, too, works with any Ethernet-compatible network.

According to Lanscan product manager Steven Gibson, "Lanscan does everything Lanalyzer does for about half the price." The product's \$8,500 price tag includes a microprocessor box and terminal, software and proprietary operating system. Besides the Lanalyzer's lack of a micro, Gibson pointed out two more areas where Lanscan wins out over its rival.

A recently updated version monitors and graphically presents the network activity of up to 250 nodes simultaneously; Lanalyzer only monitors 150 nodes' activity. And Lanscan features Time Domain Reflectometry, a test mode in which a signal is sent down the network and bounces back when it hits a cable fault.

### Volley from Excelan

Excelan's Weil answered Communication Machinery's volleys with a few of his own. First, he said, Lanalyzer can induce six simultaneous load conditions, such as number of packets or transmission speed, while Lanscan can only induce two.

Second, Lanalyzer can specify up to eight parameters determining the type of network activity it wants to examine; Lanscan can specify only four.

Third, Lanalyzer can set up 10 triggers that control when network monitoring starts and stops. Lanscan only specifies the time at which the test stops.

"We don't have Time Domain Reflectometry," admitted Weil. "But that's because it is an unreliable testing method."

Communication Machinery conceded that all of Weil's statements were accurate, with the possible exception of his dismissal of Time Domain Reflectometry.

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# FALCO 500

## COMMUNICATIONS

## They're after your business

From page 25

for getting the freight — data — to its destination on time, intact and in a form that the receiving system can read. Not only does this promise big profits, it also helps carriers retain customers in the competitive, volatile postdivestiture market.

No wonder, then, that the telecommunications industry has recently intensified efforts to figure out exactly what type of services and applications most appeal to customers. One method for accomplishing this is through ISDN trials, which are being jointly sponsored by carriers and equipment vendors.

Northern Telecom, Inc. plans to conduct at least four ISDN trials as a joint venture with different regional tele-

phone companies. The trials will take place on business sites.

### 'Not yet a standard'

According to manager of communications services Thomas Hill, the main purpose of the trials is not to test Northern Telecom's equipment for ISDN compliance — "The standard is not yet a standard," Hill says. Rather, Northern Telecom and the participating telephone company want to ex-

plore how they can best meet the business customer's needs through ISDN.

At the Western Showcase recently held in Dallas, the U.S. Telephone Association/U.S. Telecommunications Suppliers Association defined seven key application areas that address those same needs. Four of the applications were designed to help telephone companies more effectively provide ISDN-based services such as billing, signaling, network

maintenance and network routing.

The other three applications that address business users' communications needs are as follows:

- Network Transport Services or virtual private lines provided on the public telephone network.

- Network Data Services, which consist of circuit- and packet-switched transmission.

- Network Business Services, which include such business-oriented telecommunications features as voice and text messaging, data base access and comprehensive forms handling.

### Carriers' efforts

This last application area is the focus of much of the carriers' development and publicity efforts. All of the long-distance carriers offer some combination of business services as the value-added part of their transport and data services offerings.

The regional telephone companies are still battling the Federal Communications Commission for the right to provide such enhanced services.

No doubt many businesses will be attracted by the idea of putting their communications problems in the capable hands of AT&T, IBM/MCI or the friendly local telephone company.

But Joaquin Gonzalez, program director in the Strategies in Telecommunications Service at the Stamford, Conn., research firm the Gartner Group, warns that companies should think seriously before they yield to temptation.

"The question is, Do you manage your telecommunications network on your own premises, or does some firm like AT&T do it for you on theirs? They'd prefer to," Gonzalez continues, "because it then becomes much harder for customers to switch to another vendor — or to go independent."

Of course, vendors now claim that as soon as ISDN is in place, customers will be able to switch from one carrier's service to another's with the touch of a button.

But Kenneth Jankowski, manager of First Call telecommunications services at First National Bank of Boston [CW, Feb. 17] questions whether vendors are being altogether frank when they say this. "We expect regional and long-distance carriers to marginally change their protocols to lock you into their service line. MCI will be different from AT&T and so on. Look at X.25 — that's supposed to be a universal standard, and yet the way Telenet and Tymnet implement it is just slightly different. Carriers will try to gently lead you into a position of greater and greater dependence."

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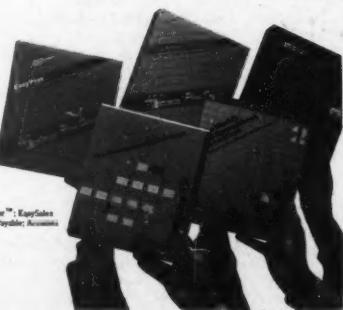
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# MICROCOMPUTERS



## SMALL TALK

Eric Bender

## Pricing changes in the wind

**S**o will the clouds open soon, revealing detailed answers to all the apparently endless questions on micro software pricing and delivery policies? Yes.

Will you hear it here first? No.

If I had figured it all out, I would be a consultant, and right now, I'd be walking a beach in the Leeward islands rather than watching litter blow through the vast and snow-swept malls in Framingham, Mass.

In one sense, pricing will always be hard to nail down — what is a fairly great but fairly easily copied idea really worth in a free market? — and right now, software is sold to large corporations in as many ways as there are industrial secrets.

And if it's complicated to figure out how to price simple little personal computer packages, think about pricing for the upcoming cooperative processing programs.

But the answers are beginning to appear, as suppliers and customers shuffle through all the alternatives, and the ground is shifting for software licensing.

Those \$100 million-plus micro software companies don't really ignore their big customers. Within about six months, we will see some rather drastic changes in how software is sold and supported in large corporations. Most of the shift will be fairly straightforward, toward fairly traditional mainframe software practices.

Although pricing is always a bottom-line concern, see PRICING page 32

**Bender** is Computerworld's senior editor, microcomputers.

## Software allows Ada to run on Personal Computer line

By Eric Bender

Software that moves the U.S. Department of Defense-sponsored Ada language down to the IBM Personal Computer line was announced this month, with compilers introduced by Alsys, Inc. and Artek Corp. addressing different segments of the emerging market.

Overall spending on Ada software is commonly estimated at between \$90 million and \$100 million this year, and the market should get a strong shot in the arm with the emergence of full-functioned versions on popular microcomputer hardware, both companies suggested.

Alsys' Ada compiler runs on the Personal Computer AT and permits full-scale Ada applications to be written for the Personal Computer line, according to the Waltham, Mass., firm. The package, priced at \$3,000 with a 4M-byte internal memory board, is available immediately.

The Alsys software "is the first full Ada implementation on the PC AT," according to a company spokeswoman.

She also predicted that it would be the first to be certified by the Department of Defense's Ada Verification Facility, with that certification expected by April.

The software, which will be demonstrated at the Special Interest Group on Ada Conference this week in Los Angeles, takes advantage of the Personal Computer AT's protected mode, allowing applications to bypass IBM's PC-DOS operating system limitations and to access up to 16M bytes of expanded memory.

The Alsys compiler generates Intel Corp. 8086 instructions for the Personal Computer XT or AT or Intel 80286 instructions for the AT.

It also features on-line Help, a consistent user interface and a multistep error

See TOOLS page 32

## NEW THIS WEEK

- Network Innovations offers its Multiplex network productivity tool
- STSC releases a runtime version of the APL Plus PC system
- For more on these and other new products, see pp. 73-95.

## INSTANT ANALYSIS

"We'll see lots of new products introduced that have nothing to do with Microsoft Windows. Our existing products would be unaffected. It makes no sense to run character-based products inside a graphical user interface."

— Jim Manzi, president, Lotus Development Corp.

## Preference shown for site licensing

### Survey of buyers indicates 90% favor purchase options

By Rosemary Hamilton

Although virtually unheard of two years ago, site licensing for personal computer software has become a popular issue among purchasers — so much so that the results of a recent study found that only 10% of buyers surveyed are not interested in site license purchases. A whopping 90% are either planning to make such a purchase next year or are strongly considering the option.

The Personal Computer Software Site Licensing Survey, completed late last year by Siteresearch of Tiburon, Calif., surveyed a cross section of software buyers in government, education and business. Questionnaires were answered by 120 buyers, primarily from MIS departments.

Siteresearch acknowledged that the term "site licenses" may not mean the same thing to all the respondents. Various personal computer software vendors are now in the business of site licensing, but their policies vary in the kind of service, support and discounts they offer as well as the terms and conditions.

Gary Cole, president of Siteresearch, said he had trouble finding two site licensing agreements that were exactly alike. However, he said he expects more uniformity as the business matures.

Because of the many variations, Cole said he was unable to define site licensing strictly for the purpose of his survey. Instead, he simply used the term "site licensing," and he "let the users define it in their own terms." As a result, the survey probably includes data on such purchasing methods as volume discounts that the respondents qualified as site licensing.

See PREFERENCE page 32

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## Oracle unveils productivity tools for SQL/RT on the IBM RT PC

Oracle Corporation has announced six software products for the newly-announced IBM RT PC system. The packages run with IBM's SQL/RT relational DBMS, which was developed by Oracle for IBM. Oracle also announced immediate availability of its full ORACLE product line on the RT PC/AT co-processor.

According to Oracle Director of Product Marketing, Ken Cohen, "The SQL/RT product which IBM is marketing on the RT PC provides a robust relational DBMS. Since Oracle was the source of SQL/RT, we feel well-suited to offer our other products directly. They provide even greater flexibility and decision-support capabilities to RT PC users."

■ **Pro\*Fortran:** The Pro\*Fortran precompiler allows RT PC programmers to embed SQL database language statements in the middle of their Fortran programs. It is intended for Fortran programs which must access or manipulate SQL/RT database information.

■ **Pro\*SQL:** Pro\*SQL is a general-purpose call-interface to SQL/RT. Using a simple set of programming calls from a variety of languages supported on the RT PC, the programmer can access SQL/RT.

■ **SQL\*IAF:** The SQL\*IAF (Interactive Application Facility) package is a complete application generator and run-time system for forms-based applications. It is a complement and extension to

the Easy SQL/RT component of IBM's SQL/RT.

The SQL\*IAF screen painter lets users design forms using what-you-see-is-what-you-get techniques. Multi-table query/update forms can be easily produced for demanding applications. Also, SQL\*IAF lets users apply data editing and validation criteria to data entered into forms. Finally, SQL\*IAF provides extensive support for non-IBM terminal types, such as DEC VT-220.

■ **SQL\*RPT:** SQL\*RPT is a report writer and formatter for use with SQL/RT. Using simple commands, users can create reports of almost unlimited sophistication from their databases.

The database information can also be included in documents formatted with SQL\*RPT, allowing text and database processing to be combined in one easy-to-use interface suitable for developers and end-users alike.

■ **SQL\*Calc:** SQL\*Calc is a Lotus 1-2-3 compatible spreadsheet integrated with the SQL/RT DBMS. Users can place SQL statements into the cells of their spreadsheets, retrieving and updating SQL/RT data automatically. Large SQL/RT databases can be shared among spreadsheet users, with all of the data instantly available to them.

■ **SQL\*Link:** SQL\*Link provides a micro-mainframe link which allows intelligent transfer of database information

between SQL/RT on the RT PC and the ORACLE relational DBMS running on IBM PCs and a variety of mainframes and minis.

SQL\*Link lets users exchange information between PCs with ORACLE and the RT PC, with the RT PC serving as a Host.

The package also lets users of SQL/RT exchange database information with a mini or mainframe running ORACLE.

■ **PC/DOS Support:** The ORACLE relational DBMS, 4GL and DOS tools are also available to run on the IBM RT PC/AT co-processor option.

Oracle produces and markets the ORACLE relational DBMS, 4GL and DOS software. ORACLE runs on a wide range of computers, including IBM mainframes, DEC, DG, HP, Stratus and most other minicomputers, and a wide variety of micros, including the IBM PC family.

Oracle distributes its products through a worldwide network of 30 direct sales offices, through the Authorized Oracle Dealer network, and through VARs which participate in the Oracle Alliance program. With its direct and OEM marketing efforts, ORACLE is used by 39 of the top 50 multi-national corporations and at thousands of sites overall.

For further information, contact Oracle Corp., Dept. CWST3, 20 Davis Drive, Belmont, CA 94002, 1-800-345-DBMS.

## MICROCOMPUTERS

## Preference shown for site licensing

From page 31

Whatever way the respondents interpreted site licensing, they are interested in moving away from the traditional way of purchasing micro software. But beyond that, respondents said site licensing would minimize the threat of copyright liability.

The survey also found that buyers would prefer to stop doing business with a dealer or distributor and buy directly from vendors. Of the buyers surveyed, 46% said they would prefer to deal with a vendor directly, 16% said they would prefer purchasing from a dealer or distributor, and 38% did not have a preference.

## Multimate WP version ships

TORRANCE, Calif. — Ashton-Tate's Multimate International Corp. subsidiary has begun delivering Version 3.6 of Multimate Advantage Professional Word Processor, Ashton-Tate said earlier this month.

The latest version of Multimate's flagship product, which runs on IBM Personal Computers and compatibles with 320K bytes of internal memory, is priced at \$595. Enhancements to Version 3.5 include columnar operations, a built-in 40,000-word thesaurus, typewriter mode, keyboard merge, custom dictionary

editor, one-page "hot print" function and an enhanced 110,000-word speller/dictionary.

Version 3.6 is configured to work with the Multimate Business Advantage Keyboard, a \$295 replacement for an IBM Personal Computer keyboard that began shipping last month.

Until April 30, Ashton-Tate said, the software will be bundled with two additional packages. Graph-link, a graphics and text integrator, and Multimate On-File, a file management system, normally have a combined price of \$245.

## Tools let Ada run on IBM micros

From page 31

checking process. In addition, the product includes a library manager, unit manager, runtime executive and predefined packages.

Artek Corp.'s compiler, available for \$895 starting this month, runs on the XT and AT. It meets virtually all of the latest Department of Defense Ada specifications except tasking, according to Artek, whose U.S. marketing offices are located in Secaucus, N.J.

The Artek program includes the compiler, a full screen editor, an interpreter/debugger, a linker/library manager and other software components, the company said.

Demonstration diskettes are available for \$29.95. The product requires at least 384K bytes of internal memory, and the company strongly recommends hard-disk storage.

## Pricing changes in the wind

From page 31

line concern, we wouldn't be seeing this ongoing, high-profile public debate if we were not between waves of technology for major applications. For the moment, the mainstream micro program seems mature, the improvements mostly incremental.

Naturally enough, this apparent lack of progress depresses some of those who helped launch personal computing. "We thought we would really change things, and all we did was put a minicomputer on everyone's desk," one Apple Computer, Inc. pioneer mused sadly a few weeks ago.

“ ”

**Right now, software is sold to large corporations in as many ways as there are industrial secrets.**

But far more than that was accomplished, of course, and the next generation of software will carry the idea much farther. We're seeing a lot of promising hints in new tools for presentations or desktop publishing, for decision modeling and scheduling projects or for accessing data from a remarkable range of sources.

These packages will require considerable horsepower to run. IBM's Personal Computer AT and Apple's Macintosh Plus are probably bare minimums, and upcoming 32-bit micros will slowly become standards.

Some of the great marketing minds of our generation are already busily working on ways to create a kind of consumer demand within business for these products.

And we'll know when the next wave of technology has arrived: People will stop talking so much about prices and licensing.

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- Incorporate advanced features such as pop-up search windows, data-edit/credit program interrupt, custom help and documentation

#### Fast

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# SYSTEMS & PERIPHERALS



## HARD TALK

James Connolly

## IBM unwraps 4381 surprises

The greater degree of speculation in late 1985 and the first six weeks of 1986 centered on IBM's plans to introduce an entry-level version of its 3090 mainframe, not on an expected performance boost for the 4381 — the system that some people consider a mainframe and others call a superminicomputer.

But when the announcement finally arrived two weeks ago, it was the 4381 portion that caught much of the industry's eye, even though the 3090 announcement featured two entry-level systems and price cuts for previously introduced 3090s.

The surprises in the 4381 package included the improvements in price/performance, the addition of a low-end system and IBM's apparent attempt to smooth the upgrade path for current 4381 owners. In connection with the ability to upgrade, IBM's move seemed a shift from its historical pattern in which even late-life kickers such as the 3080 models introduced in 1984 left existing users with no upgrade path.

Owners of the 4381 have complained about running out of gas with the previous high-end Model 3, which was rated at about 4.8 million instructions per second (MIPS) or less. It appears that IBM provided those users with room to grow into the Model 14, which has been given estimated performance ratings ranging from 5.7 MIPS to more than 6 MIPS, with compute-intensive scientific and engineering applications achieving the higher number.

In addition to that performance boost, the 4381 announcement included surprisingly large price cuts. One lessor pointed out that if someone took delivery on a 4381 Model 2 on Feb. 10, he paid \$580,000. A day later, a 4381 Model 12 providing the same power was introduced at \$390,000.

Such a deep cut may work wonders for IBM marketing forces as they try to sell the new 4381 and upgrades this year — probably the last full year of the product line. But it also knocked the stuffing out of that Model 2's residual value. In 24 hours, that value dropped by 50%, according to Russell West, vice-president of marketing for Comdisco, Inc., a leasing firm. That value could drop even more next year if, as expected, IBM replaces the 4381 again, this time with a different technology such as CMOS.

IBM's move may have been inspired by the threat of the superminicomputer vendors, such as Digital Equipment Corp. and Data General Corp., who single out the 4381's price/performance figures when they announce their own products and claim superior price/per-

See IBM page 38

Connolly is Computerworld's senior editor, systems & peripherals.

## Buyers audition RT PC

### IBM's RISC performance receives mixed reviews

By Peggy Watt

SAN JOSE, Calif. — Prospective buyers getting their first close look after the curtain rose on IBM's reduced instruction set computing (RISC)-based RT Personal Computer indicated they will wait for the next act before buying a season ticket.

Some 600 potential customers — and some competitors — attended two one-day seminars to introduce IBM's system to the San Jose area. Attendees saw demonstrations of the RT PC, which features a Personal Computer AT coprocessor, 1M byte of random-access memory, 1.2M-byte floppy disk drive, 40M-byte hard disk drive, a mouse and IBM's Advanced Interactive Executive (AIX) operating system built on AT&T's Unix System V. In its base configuration, the system costs \$18,974. Also featured were an overview and several technical seminars.

The 4M-byte memory capacity is a limitation, said Henry Wong, director of product marketing for Ecad, Inc., of Santa Clara, Calif., who was evaluating the PC RT as a potential workstation for his electronic computer-aided design system and design verification applications.

"I think in the future it would be a good workstation for us, but it needs more computing power," Wong said. Screen resolution should be higher — as much as 1,000 by 1,000 pixels — and more speed is needed for his uses, he added. Wong said he now uses Digital Equipment Corp. VAX systems and Apollo Computer, Inc. superminicomputers, but he will keep an eye on RT PC enhancements for more features.

Terence R. Hensley, marketing support engineer for Toshiba America, Inc. of Santa Clara, Calif., called the system more connectable to a Toshiba hard disk than IBM's previous top-of-the-line personal computer, the Personal Computer AT.

"Instead of specifying the device driver in firmware, they're allowing it to be spec-

See RT page 38

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## INSTANT ANALYSIS

"I think IBM has learned to come out with new products in a smoother way than they used to."

— Svend Hartmann, president of Computer Merchants, Inc., on the replacement of the IBM 4381

## Ridge offers departmental system

By Donna Raimondi

SANTA CLARA, Calif. — Ridge Computers, Inc. recently rolled out a 32-bit reduced instruction set computer (RISC) for engineering departments.

The company also enhanced its two other 32-bit models, including peripherals, a memory controller, a RISC-optimized Fortran compiler and communications features.

The recent introduction of Digital Equipment Corp.'s 8200 and 8300 machines has increased focus on the departmental machines, said a Ridge spokesman. The DEC machines established a structure for price/performance, which Ridge claims to beat in its new 32/530 system.

Ridge has joined the ranks of companies like Masscomp and Celerity Computer, Inc., which have realized that having a

workstation product is not enough, said Vicki Brown, computer-aided design and manufacturing (CAD/CAM) analyst at International Data Corp. in Framingham, Mass. Although Ridge's previous two systems were not true workstations — they have always been multiuser machines with almost minicomputer proportions, Brown said — the company has been categorized as a workstation vendor. The new system places the company squarely in the minicomputer field, she added.

The Ridge 32/530 high-end system costs \$70,700 and runs the company's version of AT&T Unix System V operating system with University of California at Berkeley 4.2 Unix version enhancements. It is targeted at multiuser applications in mechanical and electrical computer-aided design,

See DEPARTMENTAL page 38



## Burroughs counts on inventions

EIGHTH IN A SERIES

By Donna Raimondi

One hundred years ago, William Seward Burroughs filed patent application papers for an automatic adding machine that was to revolutionize the way America did business. The drudgery and monotony of clerking in the counting room of a bank had prompted Burroughs to find a better way to list and add figures.

The ideals that founder Burroughs held are the same ones that drive Burroughs Corp.'s development today, says Roy Beers, vice-president and group executive in the distributed systems group of the U.S.' third largest computer company. Burroughs' technical community understands and develops for the real problems of its users, he says.

For example, the company is currently researching a computer language that does not need to be

compiled. Such a language will eliminate the need to compute sequentially and allow parallel processing to work on general computing problems instead of just on scientific problems, Beers states. At the same time, the company continues to refine the communications and networking capabilities that make its machines compatible with each other and with other vendors' systems.

Burroughs grew from the American Arithmometer Co. that was established to market the founder's adding machine. According to its 1984 revenue, the company is now a \$4.8 billion worldwide concern that still derives much of its income from providing services to banks.

Burroughs himself died of tuberculosis in 1898 when he was 41 years old, but he left behind a legacy of inventions that included the adding machine and an automatic ribbon reverse feature that became a

See COUNTING page 34

## SYSTEMS &amp; PERIPHERALS

## Counting on inventions

From page 33

standard on typewriters.

The American Arithmometer Co. was renamed the Burroughs Adding Machine Co. in 1905 as a tribute to the founder. That same year, 7,800 machines were sold — as many as inventor Burroughs had estimated the U.S. market would ever bear.

In the early 1900s, the company embarked on its policy of growth through invention and acquisition. It started the Inventions Department in which it worked on improvements of existing products and on new products, and it bought a number of competitor firms in the U.S. and abroad.

The company's focus was on business machines until World War II when it restricted its production to the needs of the armed forces. Burroughs was cited by the U.S. Army and Navy for its mass production of the Norden bombsight, a precision instrument that had previously been thought to be impossible to mass-produce.

### Postwar electronic R&D

John Coleman, named president of Burroughs in 1946, decided that the post-war effort would be a full program of electronic research and development. Reflecting this change in direction, the firm was renamed Burroughs Corp. in 1953.

Starting in 1954, the company released computers designed for business problem solving and for scientific and engineering applications. The first digital electronic

computer the company built was the Burroughs Laboratory Computer, installed in 1951 at the company's Philadelphia research center.

Several acquisitions strengthened the company's electronic development program. From 1951 to 1956, Burroughs bought manufacturers of electronic instrumentation, vacuum tubes and computers to expand its base in the industry.

The company attracted government contracts that

fueled its research efforts with financial resources and expanded research opportunities. Burroughs was involved in the continental air defense system — called the Semi-Automatic Ground Environment (SAGE) program, the U.S. Air Force Airborne Long-Range Input system that was a seaward extension of SAGE and the Polaris missile-equipped submarines first launched by the Navy in 1959.

The company continued to

buy office supplies companies to become a single-source supplier for business and information management. Burroughs still provides electromechanical products for financial institutions, which in part led to its reputation as a banker's company, Beers says.

### B5000 debuted in '61

The Burroughs B5000 solid-state modular DP system debuted in 1961. It featured capabilities such as automa-

tic multiprogramming and multiprocessing, exclusive use of higher level languages and virtual memory.

At this juncture, Burroughs decided that subsequent generations of its systems would allow users to move from entry-level machines to the top-of-the-line systems and from generation to generation without having to reprogram.

Burroughs was selected by the Society for Worldwide Interbank Financial Tele-



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## SYSTEMS &amp; PERIPHERALS

communications (SWIFT) in 1974 to supply data processing and data communications equipment for an international telecommunications network linking 239 banks.

SWIFT, which has become one of the largest and most complex interbank systems, uses Burroughs equipment to process some 600,000 transactions per day among 1,200 banks in 42 countries.

The 1970s proved to be the company's strong growth period. "Burroughs' chief

strength is its historic customer base," says Vice-President Stephen Dube of Shearson Lehman Brothers, Inc., an investment firm in New York.

Those customers who bought Burroughs systems during the 1970s received excellent hardware and especially good software compared with what IBM offered, he continues.

The products Burroughs makes now are good but not terribly different from IBM's

offerings, Dube says. IBM has progressed in areas where Burroughs excels, such as communications, networking and on-line transaction processing, he adds, to the point that Burroughs loses market share to IBM each year.

#### Competing with force of IBM

Burroughs understands that IBM is the force with which to compete, Beers says. "They are big enough so that they are more than

the competition," he says.

"They are the environment within which we have to live. Communications and networking have to be a foundation of our architecture," he adds.

Burroughs' expansion continued into areas that included data preparation and document handling, displays, keyboards, printing terminals and related data communications systems, memory subsystems, high-speed printers, software and

special-purpose equipment for vertical applications.

#### Acquisitions expand horizons

Acquisitions again brought the company into new areas of business.

Graphic Sciences, Inc., bought in 1975, launched Burroughs into the facsimile communications market. The acquisition of Context Corp. in 1979 added an optical character recognition page reader system to the range of office automation products.

Under the guidance of former U.S. Secretary of the Treasury W. Michael Blumenthal, who became chairman of the board in 1980, and Paul G. Stern, named president in 1982, Burroughs acquired System Development Corp. (SDC) in 1980. SDC, a supplier of information systems for government agencies, joined with Burroughs' Federal and Special Systems Group in 1982 to form a subsidiary that retains the SDC name. It sells to the federal government in fields ranging from aerospace management to command and intelligence systems.

The 1981 acquisition of Memorex Corp. boosted the company's capabilities in computer storage devices, according to Burroughs officials. But this has not proven to be a boon to the company. Memorex is Burroughs' chief problem, according to Shearson Lehman's Dube. The storage company is losing money, and Burroughs' customers are wondering how credible a move the venture was, Dube says.

The 1984 acquisition of Graphics Technology Corp. was intended to strengthen Burroughs' position in the computer-aided design and manufacturing arena.

The company entered the micro age in 1982 by coming out with its B20. Developed by Convergent Technologies, Inc., the B20 operates either as a stand-alone workstation or as a component in distributed processing networks.

At the other end of the spectrum, the company launched its A series of large-scale systems in 1984, followed by the V series of mainframes in 1985.



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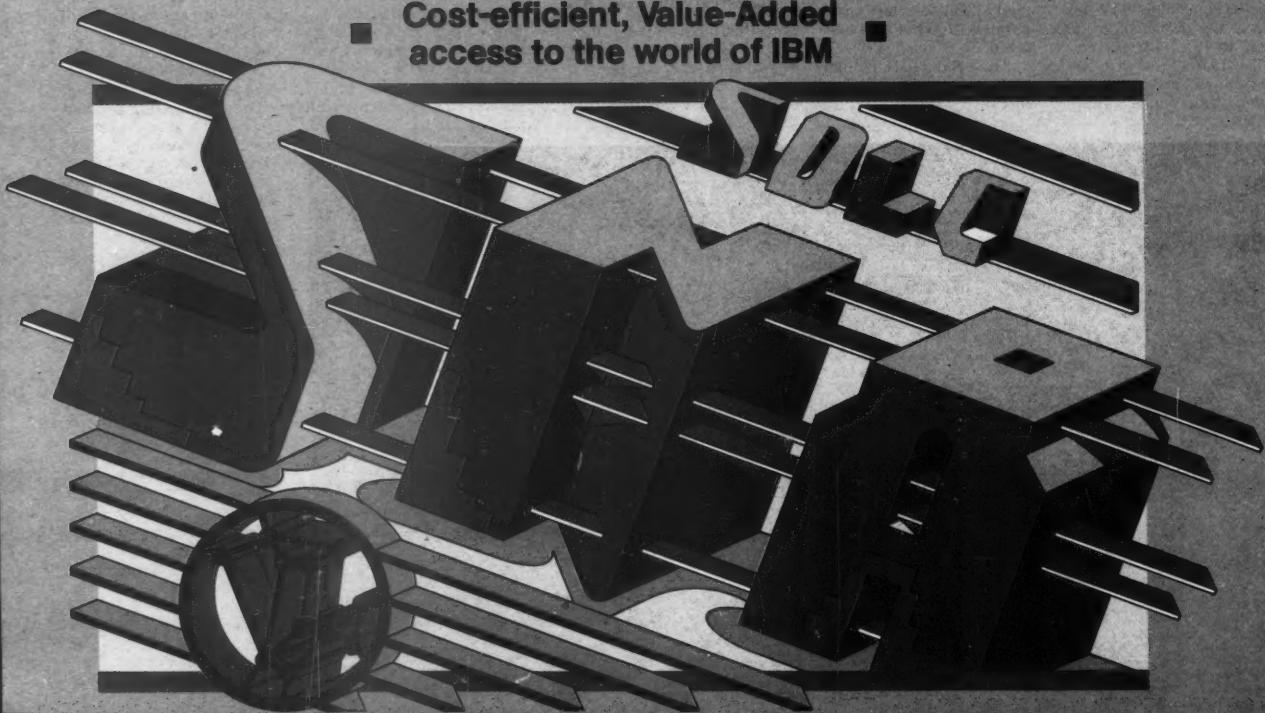
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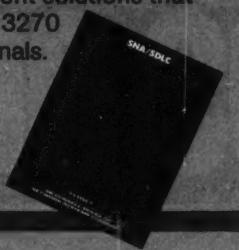
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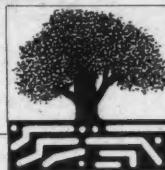
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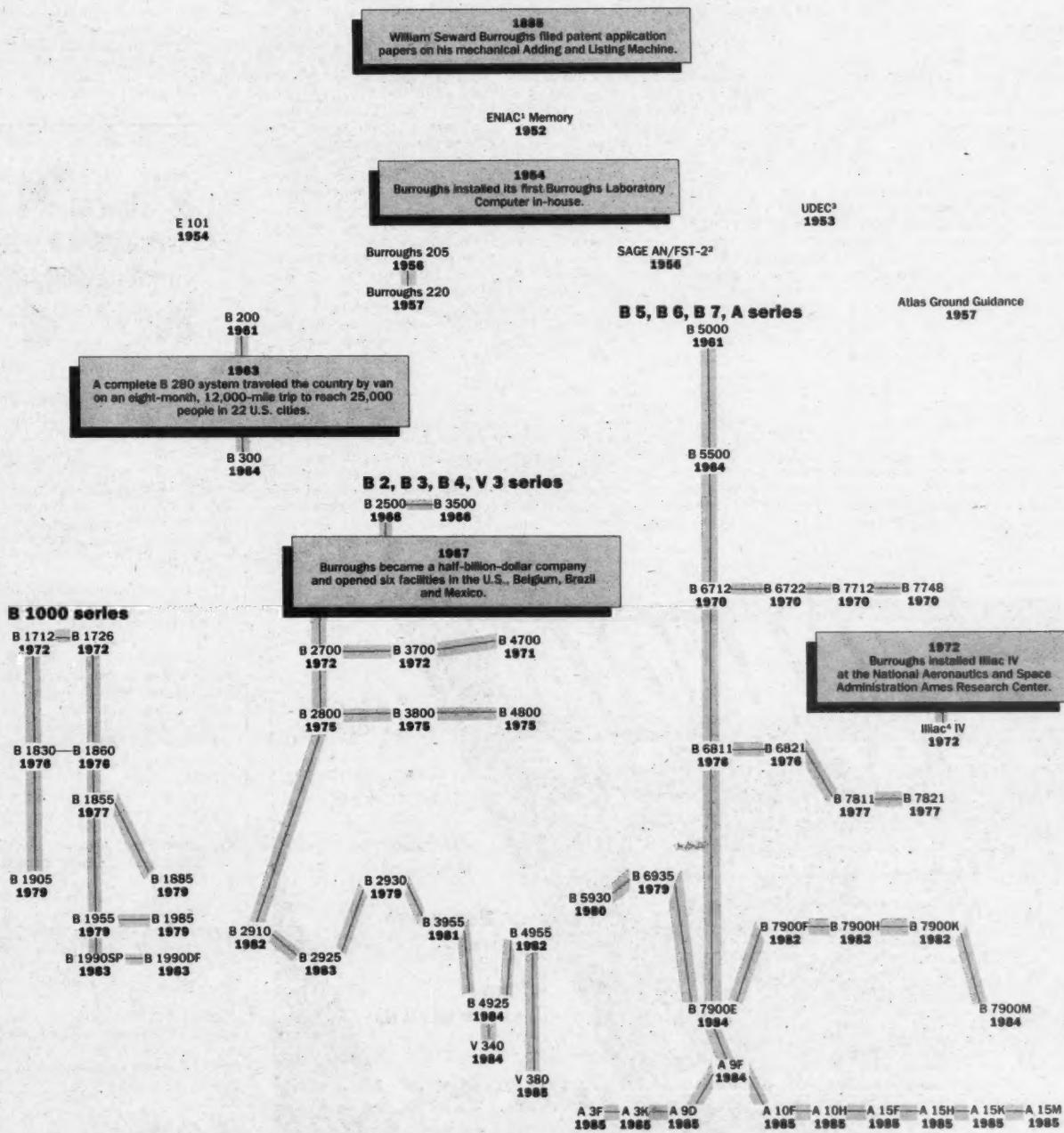
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## Burroughs Corp. Family Tree



1. Electronic Numeric Integrator and Calculator.
2. Semiautomatic ground environment alphanumeric/file status table.
3. Unitized digital electronic computer.
4. Illinois Automatic Computer.

**1988**  
Burroughs celebrated its 100th operating year.

## SYSTEMS &amp; PERIPHERALS

## IBM unwraps 4381 surprises

From page 33

formance ratios, even with the 4381 nearing the end of its life cycle.

Analyst Dale Kutnick of Wayland, Mass., is not surprised by the 4381 price/performance improvements: "I think IBM decided that they just could not afford to lose that middle range to the minicomputer vendors. They actually had not done that badly with the 4381 in 1985. I think it was the threat of the new DEC and DG machines that put the hurt on the 4381."

Kutnick noted that the 4381 had a fair year in 1985 with about 4,000 installations but that the system below it in the IBM product family, the 4361, had a poor year. He added that the low prices for the 4381 line effectively killed the high end of the 4361 family.

In that respect, IBM is competing with itself, complicating an already confusing situation at the middle of its product line. Yet IBM is recognizing the pressure being placed on it by the supermini vendors, particularly those who hammer home the themes of upgradability and compatibility. But it is on a different product cycle than its competitors. Where DEC and DG are at the start of product lives with the DEC VAX 8000 family and the DG MV/20000, the 4381 is near the end. DEC and DG have been comparing their new systems with a mature system and next year, when IBM is likely to announce a 4381 replacement, IBM will be comparing a new technology machine with systems using what will then be 2-year-old technology. This cycle could continue forever.

## Departmental system debuts

From page 33

animation, imaging and scientific research.

Up to 16 users can be connected directly, or the unit can function as a server to Ethernet-linked workstations from products that include Apollo Computer, Inc.'s Domain systems, Sun Microsystems, Inc. Sun 2 and Sun 3 workstations, DEC's Microvax II or IBM's Personal Computers. It features 12M bytes of main memory and dual 300M-byte disks. The unit, which is available immediately, can accommodate Ridge's companion storage enclosures that allow up to two 445M-byte disks and a 1/4-in. 1,600/3,200 bit/in. tape drive. The companion unit costs approximately \$40,000 in its highest configuration.

Ridge also announced upgrades to its 32/100 and 32/300 series stations. The \$6,000 Ridge implementation of IBM's Houston Automatic Spooling Program (HASP) and PC Interface software from Locus Computing Corp. cost \$1,500 for both the minicomputer and personal computer portions. Both portions allow IBM Personal Computers to act as front ends to Ridge systems, which act as front ends to IBM mainframes that support HASP remote job entry. Also available are the CCA Uniworks, Inc. Emacks Unix-based editor and a memory controller that can address up to 16M bytes of main memory.

In addition, the company announced its \$4,000, RISC-optimized Fortran compiler; a desktop Cipher, Inc. streaming tape for \$12,540; and a Prior Data Sciences, Ltd.'s Graphics Kernel Software library, which costs \$2,100.

## RT PC auditon gets mixed review

From page 33

ified in software," he said. Hensley interpreted that as an indication that IBM wants to encourage third-party activity with the RT PC.

Still, connectivity options left something to be desired for Dewayne Hendricks, president of Veritas Technology, Inc., of Soquel, Calif. He said he is reluctant to adopt the RT PC for his computer-aided design and manufacturing (CAD/CAM) and desktop publishing business until he knows what IBM has planned next in the system's evolution and in its connectivity to other systems.

"I like what I see, but they say it's strategic," he said. "IBM has many tongues, some of them forked. With the 370, I see my expansion path. With this, I see growth potential—but where next? There are too many products coming out too fast to assimilate and incorporate into your organization." He added, "You don't get a sense of strategic direction."

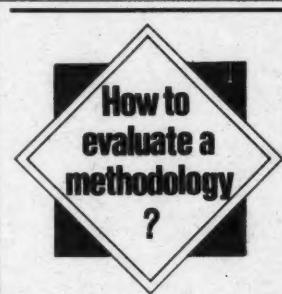
Another IBM watcher said he sees the RT PC as an indication of good innovations to come. "As a first step, it's a nice one," according to Milos Krejick of San Jose, editor of "ASICs Review," a newsletter for semiconductor and programmable integrated circuits. "It's very rewarding to see IBM use up-to-date technology." He contrasted it to the pioneer Personal Computer, "outdated at its release."

A trio of technical coordinators from Lockheed Missiles & Space Co. of Sunnyvale, Calif., said they, too, like the machine but defer to their counterparts in the engineering labs instead of lobbying to buy the RT PC for their business applications.

"We're always looking for something new, but the only thing that would help us is the speed," said Earl Yagi, Lockheed staff member. "Besides, we're a Cobol house. I'm sure there's some applications for it, but we can't justify it."

Lockheed's information management systems do not need the regression analysis or scientific features, according to Billie E. Griffis, project leader. "We'll let the scientific side of the house look at it," he added.

IBM Fellow Glen Henry, who managed the RT PC's development at IBM's Engineering Development Group in Austin, Texas, introduced the system at the seminars. He noted the system incorporates technology from within and outside IBM, building on PC-DOS compatibility and including the AIX, and draws from third-party software developers.



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# Executive Report

Edited by Janet Fiderio and Becky Batcha



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## Applications development

*A guide through the maze of tools and methods*

By ROBERT LORENTZEN  
and PAUL TINNIRELLO

In the revolutionary world of applications software development, technology moves forward like a speeding bullet. An assortment of tools, languages and methodologies whizzes by, some products on their way to massive popularity, others en route to extinction.

For the manager of any sophisticated development project, the choice of development tools acts as a bullet as well. The right tool for a project can quickly hit its intended target and produce a successful system; the wrong one can stray, just as quickly, and become a lethal projectile.

System development managers wonder whether to abide by a method with which they are familiar (the standard system development life cycle, for example) or to test a new technique (prototyping, perhaps, or a modified development cycle).

They worry that the tools they choose for a project — the fourth-generation languages, application generators, relational data base management systems and so on — will pass into obsolescence before the project ends. They wonder, too, whether executive management will hold them liable if this worst of ends occurs.

Such concerns suggest that organizations need to adopt procedures for weighing each new development tool's promise against each project's realities and for predicting obsolescence, even accepting it when necessary.

The system development manager should not attempt to shoulder the entire burden himself. Rather, his organization should work out a plan that allows a variety of people to guide the acquisition and use of new applications development tools. Staff members from the DP department should contribute their technical knowledge, while executives and end users lend their business savvy to the cause.

A solid corporate plan for applications development includes five major components:

- The identification and classification of business needs and problems.
- The formation of a technology task group.
- The decision to use traditional or experimental technology.
- The selection of specific development

*If managers want to find their way through the maze of applications development tools, they cannot remain ignorant of the business functions their applications are meant to serve.*

*Robert is vice-president of data services, and Tinnirello is manager of data services programming for A. M. Best Co., an insurance industry information services firm in Oldwick, N.J.*

## A guide to the maze of methods and tools

**Continued from previous page**  
techniques and tools.

- The implementation of development techniques and tools and the control of their use.

Participants should take care not to burden the plan with bureaucratic overhead. If overcomplication and overmanagement seep in, the plan will hinder the development process rather than help it.

**Identifying business needs.** Careful scrutiny helps an organization determine which of its applications will benefit from new development technology and which will not. As such, this first stage of the corporate plan is a crucial one.

For help in identifying needs, employees who participate in development tool acquisition should turn to their organization's overall business plan. Most organizations rely on one-year or five-year plans to guide their business strategy, and most plans list the needs and problems the corporation wants to address. If a software development team attacks these specific needs and problems, it increases its chance of developing successful systems.

Participants should also learn to distinguish between ongoing business needs and dynamic business problems. Typically, an organization can rely on traditional tools and methodologies to meet its stable needs like accounting and payroll. In the same vein, more experimental methods may provide a firm with its only hope of responding to rapid or unexpected change in the business climate.

Clearly, then, if system development managers want to find their way through the maze of applications development tools, they cannot remain ignorant of the business functions their applications are meant to serve. If the data processing department hopes to make wise decisions, it cannot keep itself apart from other business groups.

The corporate plan for tools acquisition should help everyone come together because it eases the strains that often mark relations between DP and other functions. Everyone involved with a given application, whether from the business side or the technical side, helps determine how to proceed.

**Forming a technology task force.** An organization forms a technology task force to keep steady watch over advances in technology. Managers can assign people to participate either full-time or part-time, but the task force should operate consistently.

Task force members perform two major functions relative to applications software development. First, they investigate and evaluate the development tools that the organization uses day to day, noting those that could stand improvement. Second, they keep watch on new technology, looking for tools that might improve targeted weaknesses. When they spot a new tool that seems well suited to the organization's business problems, they alert the development manager and managers of relevant end-user departments.

Because task force members monitor existing operations and upcoming technology, they can act decisively

when they uncover a new product that suits the organization's needs. Their preparations allow the organization to implement any new technology in the least possible time.

This ability to act quickly helps an organization survive in today's hectic business environment, where companies require shorter and shorter development times. Drawn out development schedules are becoming completely unacceptable because no company can afford to fall behind its competition.

The task force also helps the applications development effort by relieving the development manager of the responsibility for keeping up with every technical advance that comes along.

**Deciding between traditional and experimental technology.** In making this decision, the development manager often confronts a dilemma. He knows the traditional system development life cycle will work because it has worked in the past. He realizes, too, that his programmers cannot meet the short development schedules required of them unless they use newer, quicker, untried techniques.

If an organization has no corporate plan for development tool acquisition, the manager finds himself struggling with one problem after another:

- He considers using rapid prototyping methodologies and tools, which promise drastic cuts in development times, but he finds that these aids sometimes raise end users' hopes impossibly high.

- He then looks into relational data base management systems, but the debate on that front only adds to his confusion.

- Next, he tries to find out whether procedural languages, fourth-generation languages or artificial intelligence languages serve best for development, but all he discovers is another lively debate.

To compound these problems, the manager must also judge whether the new technology is worth the cost and effort its adoption will entail and whether premature obsolescence will put his final choice to shame. Finally, the manager gives up.

Unable to choose among alternatives, he decides just to wait and see if a sure thing shows up in the near future. More often than not, nothing does.

If, on the other hand, an organization identifies its business needs according to a corporate plan, the manager's task becomes relatively easy — especially if he can rely on his firm's end users and

technology task force members for help. The development manager and the other participants should begin by deciding whether the application will serve a long-term, stable business need or a short-term, dynamic business need. The classification will, in turn, help the participants to determine whether the application will benefit most from traditional or experimental technology.

Short-term needs justify the use of low-cost experimental technology — especially personal computer-based development aids — mainly because the risk of

### A CORPORATE PLAN FOR THE ACQUISITION OF DEVELOPMENT TOOLS AND TECHNIQUES



**Identify and classify business needs.** An organization's overall business plan generally lists specific needs. Careful scrutiny of these needs helps determine which ones will benefit from new development tools and techniques and which ones will not.



**Form a technology task force.** A group of people dedicated to watching for new developments can help an organization act quickly and decisively when a tool that matches a business need comes to market.



**Decide between traditional and experimental technology.** For short-term projects, experimental tools pose little risk if they are inexpensive and can be implemented quickly. For long-term projects, experimental tools carry the risk of obsolescence, but that risk diminishes if an organization implements them as a series of short-term solutions.



**Select specific tools.** Any well-directed selection process works as well as any other, as long as managers work toward solving business needs and keep the process in line with the overall corporate plan.



**Implement tools and control their use.** The purpose of implementation is to use acquired software tools for solving business problems and meeting business needs — not to allow new technology to proliferate beyond control.

CW Chart

A solid plan gives managers a framework for choosing between traditional and experimental tools.

### Expert's Opinion



Applications consultant Schur

## Put prototyping to proper use

By STEPHEN SCHUR

**S**ince the advent of relational data base implementations and fourth-generation languages, applications prototyping has gained recognition as a fast-track tool for development.

Through prototyping, systems professionals can join forces with end users to create working models — rather than mere paper charts — of new and enhanced information systems.

This approach promises the benefits of speed, cost-effectiveness and user satisfaction. But to obtain these benefits, organizations must avoid two traps.

The first trap, the endless loop, closes in when programmers prototype and reprototype a given system but never get around to turning their models into complete, implemented applications.

The second, the blue-sky trap, snares any organization whose programmers build an application they have no hope of implementing, an application with too many wonderful features for the organization's host or software environment to support. Both traps spell trouble for managers at budget review time.

By heeding the suggestions that follow, MIS managers can help their shops attain the benefits of prototyping and avoid the risks.

**Set up relevant project control.** No organization wants a kaleidoscope prototype, one that changes hue and transforms itself infinitely. Prototyping is a goal-directed activity; its objective being to deliver an information system on time and within budget. An organization must employ formal control mechanisms, just as it does for traditional development projects.

The specific project control method an organization chooses for its prototyping efforts must be oriented toward prototyping. It should allow for the definition of milestones and the tracking of the development effort. It must also enforce deadlines,

See SCHUR page 42

**Schur is president of Productive Methods, Inc., a San Mateo, Calif., consulting firm that specializes in applications prototyping.**

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obsolescence is lower and the consequences of failure are less dire than they would be in more far-reaching applications.

In long-term applications, the risks and consequences of choosing experimental technology increase, and many organizations choose to stay with a tried-and-true approach.

Development managers become especially apprehensive when they hear reports that seem to discredit experimental tools. Stories about the New Jersey Department of Motor Vehicles' recent travails with a fourth-generation language [CW, Sept. 30], for example, struck fear in some fairly stout hearts.

But fear of failure or obsolescence is no reason for a firm to shun new development technologies altogether. The larger the project, the more

" Fear of failure or obsolescence is no reason to shun new development technologies. The larger the project, the more good a speedy tool can do.

good a speedy, efficient tool can do. Most organizations will benefit from a stepping-stone approach to long-term projects.

Under this approach, a company acquires new tools and techniques

one by one, as a series of short-term solutions to a specific long-term business problem.

When one tool's usefulness expires, the organization reexamines the business problem and replaces the obsolete tool with a new one that is better suited to current business circumstances.

Companies that are currently switching from Cobol code generators to preformatted screen painters are using the stepping-stone technique to good advantage.

**Selecting specific tools and techniques.** Once an organization decides to meet one of its business needs with a fourth-generation language, a prototyping methodology or some other type of advanced development tool, it needs to choose a specific

*Continued on page 50*

#### SCHUR from page 40

despite the swings and roundabouts of the prototyping environment.

Most commercial project control products cannot pass muster. If an organization cannot avoid using a conventional systems life cycle methodology, it should modify that methodology to suit the repetitive nature of the prototyping cycle.

**Avoid overkill.** The scope of any prototyping effort must match users' needs and budgets, just as the scope of any traditional effort does. But technical staff members can easily get carried away and start designing a prototype whose functions overshadow the business problem at hand. Managers need to size down such prototypes, lest costs munch through users' budgets.

Users also get carried away. They often request more functionality in the prototype than they can afford to support in the finished system.

To keep prototypes simple, the project team should conduct a miniature cost-benefit study that relates each function in the prototype to a function in the user area, taking into account the staff and budget allocated to supporting each function.

**Fit the method to the environment.** Organizations must decide whether to construct their prototypes as throwaways or as designs that will evolve into production systems. Implementation considerations should drive the decision.

If a project team is designing a module that will be implemented within a mature Cobol application, for example, management should probably opt for a throwaway prototype. If the team is designing a completely new application to run with a relational data base, however, management would be wise to use an evolutionary approach.

**Pick a balanced team.** No organization should assign a crew of juniors to its first prototyping effort. An inexperienced programmer/analyst may have difficulty providing technical guidance, and a junior end user might overlook important functions. Similarly, no project team should recruit executive management types for its efforts. Executives cannot spare enough time for effective participation.

MIS managers should try to assemble teams of experienced professionals and should aim to establish equal levels of responsibility for end users and technical staff members.

**Train, but don't overtrain.** All project team members require some technical training — programmers and end users alike. They need to understand the software tools involved in building prototypes and the prototyping methodology itself. Inadequate training, especially in prototyping methods, greatly increases the risk of failure.

Of course, training requirements differ for end users and technical staff members. The object is to teach each person exactly as much as he needs to know about new tools and techniques — and no more.

**Involve all players.** Prototyping allows auditors, systems programmers and data base administrators to get involved with system design at an earlier stage than usual, which offers MIS managers a chance to guard against future snags. If all players participate from the outset the finished product will come as a surprise to no one.

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**Straight talk about  
application  
software packages.**

# “Most application software packages are functionally rich. The problem is, that's simply not enough.”

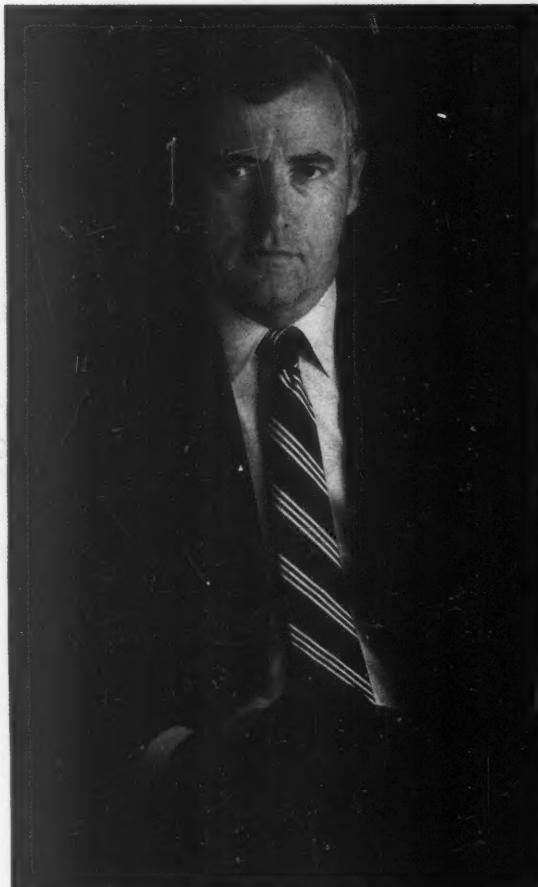
While everyone agrees that packaged applications possess great potential to save time and money, you'll hear a lot of people—from MIS directors to operations managers—tell you the ones their companies have implemented fall somewhere short of satisfactory.

Typical limitations include the fact that the packages require such extensive modification that the savings they seemed to offer totally disappear. Another common complaint is that one application package fails to integrate with another. A third shortcoming, and perhaps the most common, is that packaged applications cannot be easily adapted to reflect the changing nature of the business.

You have only to look at the architecture of most of the applications currently in use to understand why these problems exist.

Many companies today depend on applications designed with technology from the 60's and 70's. Some are 2nd generation applications built without any reliance on database architecture. Others are 3rd generation applications that provide only a generalized *interface* to a database management system; in addition, many application vendors provide a common front end user interface to mask inefficient architecture. The result is that these 3rd generation applications realize only about 10% of the power of a DBMS. *And that's simply not enough.*

Without full use of the facilities of a superior DBMS, users of application software find it extremely difficult to



adapt and extend an application package to their current as well as to their future business needs. And *only* when an application is built with advanced database technology can it provide the sharing of data that leads to functional integration between different application modules.

Ultimately, what's required is software that goes beyond the conventional packaged applications approach.

*What's required is 4th generation applications software—software that's rich in functionality, and whose underlying architecture is built on, and takes full advantage of, advanced database technology.*

Fourth generation application software is created using a comprehensive application development facility combining a fourth generation language and end user query and reporting facilities with an integrated data dictionary. Furthermore, fourth generation application packages are functionally integrated, sharing common data between independent modules. This creates an environment to easily adapt and

extend an application package, and provides realtime access to all information.

Only fourth generation application software packages enable a company to realize the full potential of packaged applications.

It is clear, therefore, that all application packages of the future will be built using this technology...because it doesn't make sense any other way.

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## 2. Functionally Integrated

Businesses today demand applications to do more than address individual functions. Businesses today need applications that recognize the interdependencies within an organization—in short, applications that can share data. For example, efficient real-time, four-way matching of invoices with receiving, purchase and inspection documents can only be achieved through true sharing of data, and this sharing of data can only be achieved with an advanced database technology which delivers that integration. Redundancies are eliminated and productivity is increased when all applications dynamically reflect the operations of the organization. By sharing an architecture that provides for optimum use of an organization's information, Cullinet's manufacturing, financial, human resources and banking applications fulfill this need.

## 3. Easy to Tailor

Although many businesses appear on the surface to operate in a common fashion, each, in fact, is unique. Applications must therefore be built with an optimized set of tools that permits them to be adapted to a company's way of doing business, rather than having the company have to

adapt to accommodate the software. Cullinet applications are designed to accommodate change. They provide the means to personalize screen layouts, capture new information, reformat reports, resequence transactions, and change messages without impacting the entire environment. Only Cullinet's applications can provide this environment for adaptability through their integration with advanced database technology. In this way, Cullinet applications give users the independence to adapt them—quickly and efficiently—to meet the unique requirements of the business.

## 4. Easy to Extend

As a business changes and grows, so do its needs and requirements. Cullinet provides easy to use, menu-driven facilities that permit functional extension of an application while preserving integration. An end user can quickly react to new requirements by prototyping an application functionally, developing new reports and performing ad hoc queries immediately. MIS can efficiently develop new, associated applications sharing common data and built utilizing the existing architecture. The Cullinet architecture segments the program logic, edit and validation criteria, as well as the security and recovery process, and therefore the complexity of creating new application functionality is significantly reduced.

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## Interview

**Codd stresses importance of shared data and sublanguages**

**E**dgard Codd, developer of the relational data base model, is not a one-dimensional man. Codd, though best known for his work in the data base management field, has definite points of view concerning languages and their future development.

Codd's interest in languages, and sublanguages in particular, dates back to days before his work on the relational model. Codd spent several frustrating years at IBM trying to simplify PL/I before it got out to the general consumer.

*It was during this project that Codd discovered how difficult it is to alter languages like Cobol, Ada and PL/I. As a result of his experiences with PL/I, Codd developed a sublanguage to deal with shared data when he began work on the relational model.*

*Codd says that sublanguages should communicate with and provide cooperative support for the host language.*

Codd recently spoke to Computerworld Senior Editor Janet Fiderio about languages, especially his impressions of fourth-generation languages, and other issues that face DP and MIS managers when they are involved in applications software development.

*Currently, Codd divides his time between the Relational Institute, a business that sponsors seminars to promote the relational approach, and the Codd and Date Consulting Group, both located in San Jose, Calif.*

**How do you define a fourth-generation language?**

I don't define them. I am leaving that for other people, and I find that so far there aren't any good definitions. I don't think it is enough to say that the conciseness or the development of the statement of fourth-generation languages has to be 10 times faster or 10 times briefer.

First you have to define what the language has to do for you; conciseness is a property of the language that you may then aim for. It [conciseness] is only a property; it does not define the language.

I contend that if you want merely to obtain conciseness, you should not invent a new language, but you should take a very popular one, Cobol, and simply see what conciseness you can get by making a purely syntactic change to it.

**Would this syntactic change make Cobol more productive or efficient?**

One reason to do a syntactic change is to increase productivity. The other reason is so that you would be able to translate from Cobol into this condensed Cobol and back.

If an application program were written in the condensed version, it could be translated into the long-winded version by a computer without losing any meaning.

You would have documentation to the same degree as you have today with Cobol. In addition, you would

have the advantage of being able to have users who are familiar with Cobol use the concise version for productivity.

I think this scheme ought to have been analyzed to see if it produced a good payoff.

**Are fourth-generation advertising claims of 10 to 1 productivity increases accurate?**

I don't know. I don't have an opinion on that subject because I don't know of any evidence to support those claims of a scientific nature.

**Is it possible that these claims are just marketing?**

I tend to think that there is a lot of marketing playing going on. The main point that these languages overlook is the handling of shared data.

If you look at various fourth-generation languages, you find that they retain the one-record-at-a-time old approach to data bases.

In other words, you have to navigate through the data base whether you want to or not, and you must write loops to get at the data that

can be compared to the change from punch card machines to stored program machines. It is a radical change. It is a change in the whole way of looking at data processing, and if you overlook it, you might as well retire.

**When it comes to choosing new development software or methods, our readers are bombarded with products and new technologies. The amount of information that they must absorb to make sound decisions is mind-boggling. How can they get a grip on these tasks?**

I think the aim here is to provide an adequate foundation for further developments. In other words, I wouldn't buy screen painting or graphics support packages, which I consider icing on the cake, until after I picked out the cake. I think the cake in this example is how data is managed in the commercial world.

**Managers should start with data management and build from there?**

I think that only a very tiny company can say that data management is not their main concern. Companies

knowledge can determine what is in the data base and analyze the material without having to learn all about loops and pointers and all the other things we get involved with.

**As far as other development methods go, can prototyping provide companies with dramatic productivity increases?**

I don't think prototyping by itself can give the productivity increase that we would like. I think that prototyping is important, but it has to be made cheap in the sense that it shouldn't be as expensive as the development of the final product.

An attack on this problem is to make sure that artificial complexities don't enter into the prototyping picture. What I mean is the complexities that are in the prototype development because of the low level at which existing systems tackle the problem.

You see, I consider IMS, IDMS, Datacom DB and CCA204 all quite low-level systems. It is almost as though those vendors [IBM, Cullinet Software, Inc., Applied Data Research, Inc. and Computer Corporation of America, respectively] and the people who advocate those approaches are saying, "Use this level of language even though it is low."

They must know by now that it is low. If they don't, it is high time that they did. It is almost as though software vendors were saying to users, "Use assembly language. Don't try to go up in level."

Prototyping is improved when you have higher level languages to work with.

**Such as?**

Well, for example, if a data base is involved in a great deal of prototyping, a high-level data base sublanguage is needed. Of course, if you have a lot of screen paging or other features in a fourth-generation language, you would like to have those areas covered.

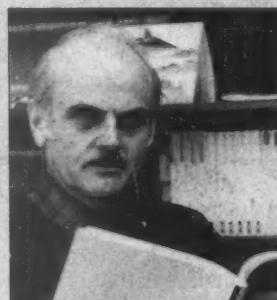
I don't know, by the way, of any fourth-generation language yet that includes a relational data sublanguage or even cooperates harmoniously with that.

**Do you have any final advice for managers involved with the issues and methodologies of application development?**

I do. Get on board with some efficient and rich relational system. By rich I mean that it should comply with at least 50% of the 12 rules that I have published. Then you will have a system that will stick with you for a long time — partly because it is based on such a solid theoretical foundation.

This is where a lot of software vendors go astray — pooh-poohing a theoretical foundation. Sooner or later, however, they will discover they should have had it.

And by the way, I still challenge anybody in the whole computing and data processing field to come up with a good argument that some feature of the relational model is not practical.



Edgar Codd

you need.

Writing programmed loops is something that only programmers can do, and even they often produce bugs that way. Loops are very bug prone.

**What are the benefits of fourth-generation languages?**

Some of them tackle screen painting in a neat way, and some of them support graphics in a way that is needed. Others support application development and dictionary extensions and things like that.

**It sounds as if you're describing pieces of a tool kit.**

Yes. I think that they should be thought of in that way rather than all wrapped up as one fourth-generation language that is distinct for each vendor.

It would be better to think of them as a tool kit for screen painting, a tool kit for application development, a tool kit for all the different things that they tackle.

The fact that they [fourth-generation language vendors] overlook shared data is incredible to me.

The impact of shared data today

of any size must be concerned with managing data effectively so that regular operations are supported, like billing customers and making sure that bills are paid.

In addition, however, due to changes in governmental regulations such as taxing, companies must be able to analyze their activities in a number of different ways. Even a company as small as this Relational Institute needs to do that.

We are setting up a relational data base for our business. We are just a few people, but the point is that we have to analyze where our efforts are going and which ones are profitable and that kind of thing.

This can't be done if data isn't organized in such a way that you can carry out different kinds of analysis without hiring some highly skilled programmers to do the job.

If you use something like IMS, you have to have people with immense skills in programming to handle the job.

Those people are costly, and I think it is time that businesses got their shared data under control so that not only programmers but people who have no programming

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## Appropriate tools, methodologies ease development effort

**Project size dictates which aids will keep time, cost at a minimum**

By T. CAPERS JONES

**S**oftware development is not a homogeneous activity. The tools and methods that work best vary widely according to project size, and managers must make a deliberate choice to select the right set.

For the sake of distinguishing among development aids, applica-

tions can be divided into eight general size ranges. Within each range, specific tools and methods hold the current records for keeping development schedules short and holding costs down.

□ □

### Very small applications — 500 or fewer lines of source code.

Unquestionably, spreadsheet packages hold all the productivity records in this range, where applications development has migrated over to the hands of software users.

Interpreted languages such as Basic, Pascal and C take second place.

Development schedules for very

small applications are sometimes shorter than one day, and costs seldom exceed \$1,000.

□ □

### Small applications — 501 to 2,000 lines of source code.

This is the size range in which database query languages excel and tend to set records; fourth-generation languages make their mark as well.

End users write many small applications, and spreadsheets and interpreted languages are common tools. But programmers do the majority of the work.

Schedules for small applications

usually run a week or two, and costs are usually less than \$5,000.

□ □

### Low-medium applications — 2,001 to 8,000 lines of source code.

Fourth-generation languages compete fiercely with program generators and applications generators for the productivity records in this range, with the generators perhaps holding a slight edge.

Spreadsheets can no longer handle the load, and query languages begin to lose pace.

Schedules for low-medium applications begin to get measured in months, and costs start running up toward \$50,000.

□ □

### Medium applications — 8,001 to 32,000 lines of source code.

Paperwork, in the form of specifications and user documentation, mounts to about 30 English words for every line of source code in medium applications.

Because of this, development teams that use automated design tools in addition to good programming languages tend to set world productivity records.

Competition is hot among fourth-generation languages, program generators, applications generators and traditional third-generation languages like Cobol and Fortran.

Schedules for medium applications often exceed a year, and costs can exceed \$250,000.

□ □

### High-medium applications — 32,001 to 128,000 lines of source code.

Together with paperwork, the defect-removal costs associated with integration and testing begin to exceed pure coding costs in the high-medium range. Because of this, projects that use a synergistic combination of good requirements, design, prototyping and defect removal come out ahead of the pack.

Pure coding also makes a significant impact on productivity, but because performance requirements are often severe, programmers tend to shun fourth-generation tools in favor of conventional languages like C, Cobol and Fortran.

Schedules for high-medium applications often exceed two years, and costs can approach \$1 million.

□ □

### Large systems — 128,001 to 512,000 lines of source code.

The projects setting world records in this size range usually rely on synergistic combinations of good requirements, design and prototyping, coupled with both paperwork control and defect removal (including inspections or structured walk-throughs).

Performance constraints are so severe that kernels of assembler must sometimes support even third-generation languages.

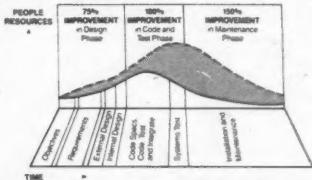
Schedules for conventional large

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*Jones is chairman of Software Productivity Research, Inc., a consulting and expert systems development firm based in Acton, Mass.*

system development often exceed four years, and costs can exceed \$15 million.

Another technology — building systems from libraries of standard designs and reusable modules — is starting to challenge such conventional development and set new world records in the large systems range.

Reusability can sometimes shorten schedules for large system development to a year or less.

Languages that support full reusability — Ada, Smalltalk and Objective-C, for example — are starting to move ahead in this domain.

□ □ □

**Very large systems — 512,001 to 2,048 million lines of source code.**

Reusability, paperwork control and automated communications among project staff members begin to gain significance for very large systems.

Projects that use highly automated requirements, design, planning, management and development methods generally set the world records in this size range.

Typically, programmers for record-setting systems draw 30% to 75% of their code from reusable sources.

Schedules for very large systems can exceed six years, and costs can exceed \$50 million.

These factors explain, perhaps, why one-quarter of the very large systems that get started are canceled before they get finished.

For very large systems constructed around reusable code, schedules of less than two years are sometimes possible.

“

**Reusable designs and reusable code hold promise for the future, but the risks of absolute failure may remain high for super large software systems.**

**Super large systems — more than 2,048 million lines of source code.**

Super large software systems tend to rank among the most costly and lengthy objects ever constructed by human beings.

In this size range, successful completion of a development project is a rarity. And only careful planning, management, requirements, design, paperwork control and defect removal allow those systems that actually reach completion to work reasonably well.

Right now, organizations can use only the first three generations of programming languages for systems in this size range.

Reusable designs and reusable code hold promise for the future, but the risks of absolute failure may remain regrettably high for super large software systems.

Schedule durations in excess of 10 years and costs greater than \$500 million are possible with applications in the super large software range.

## MATCHING DEVELOPMENT TOOLS TO APPLICATION NEEDS

Application Size	Lines of Source Code	Best Development Tools and Methods
Very small	500 or fewer	Spreadsheet packages
Small	501 to 2,000	Data base query languages
Low-medium	2,001 to 8,000	Fourth-generation languages: program and application generators
Medium	8,001 to 22,000	Automated design tools and good programming languages
High-medium	32,001 to 128,000	Good requirements, design, prototyping and defect removal
Large	128,001 to 512,000	Good requirements, design, paperwork control and defect removal; reusability
Very large	512,001 to 2,048 million	Highly automated planning and development; reusability
Super large	More than 2,048 million	Three-, four- and fifth-generation languages

Source: Software Productivity Research, Inc.

Now there's a tool to support your analysis and structured design. It's called DesignAid, from Nastec Corporation.

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Nastec's DesignAid is everything you need to eliminate the problems of building software, and to create high quality systems faster. It's your complete support tool for structured analysis and design.

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## Executive Report / Applications Development

**Continued from page 42**  
product from a specific software vendor.

A formal selection process — one that works toward a well-defined set of objectives — helps tremendously at this stage.

A company should feel free to use any common selection method (a weighted, unweighted, static or dynamic evaluation; a pilot project; or a benchmark) because no one method ensures significantly better results. But participants in the selection process need to recognize five important points.

**F**irst, choosing from a few excellent alternatives is more desirable than choosing among a plethora of poor selections.

The software development marketplace remains so competitive that anxious vendors are releasing some low-quality, untested products.

Participants in the selection process should identify

“ ”

*Many software selection processes fail because an organization fails to define its business problem properly or fails to assign trained personnel to the process.*

such products early on and eliminate them from consideration.

Second, no vendor deserves blind trust, no matter how good that vendor's reputation is.

User organizations must see that each of their prospective vendors defines its products clearly and explicitly.

Many vendors either overestimate their products' capabilities or underestimate their clients' needs although honorable vendors recognize when their product is inappropriate and objectively recommend alternatives.

Third, the longevity of a vendor is as important as the viability of that vendor's software tools.

User organizations should stay alert to the need for continuity of support throughout their applications' life cycles. If a vendor is not around to service and maintain its products, the user organization loses out.

Fourth, complete objectivity does not exist; everyone holds biases and preferences.

End users, managers and consultants have all been influenced by exposure to certain vendors and products, and all participants view the

selection process from different angles.

If the selection team recognizes its members' biases, the group as a whole can work around them.

Fifth, many software selection processes fail. This is not because an organization follows a bad method but because the company fails to define its business problem properly or fails to assign trained personnel and sufficient time to the process.

Maintaining the software selection process as an integral part of the corporate plan provides continuity and a foundation for success.

**I**mplementing development tools and controlling their use. Because poor implementation can undermine the best of plans, this stage is as critical as the selection process. As with the selection process, success depends on incorporating implementation within the

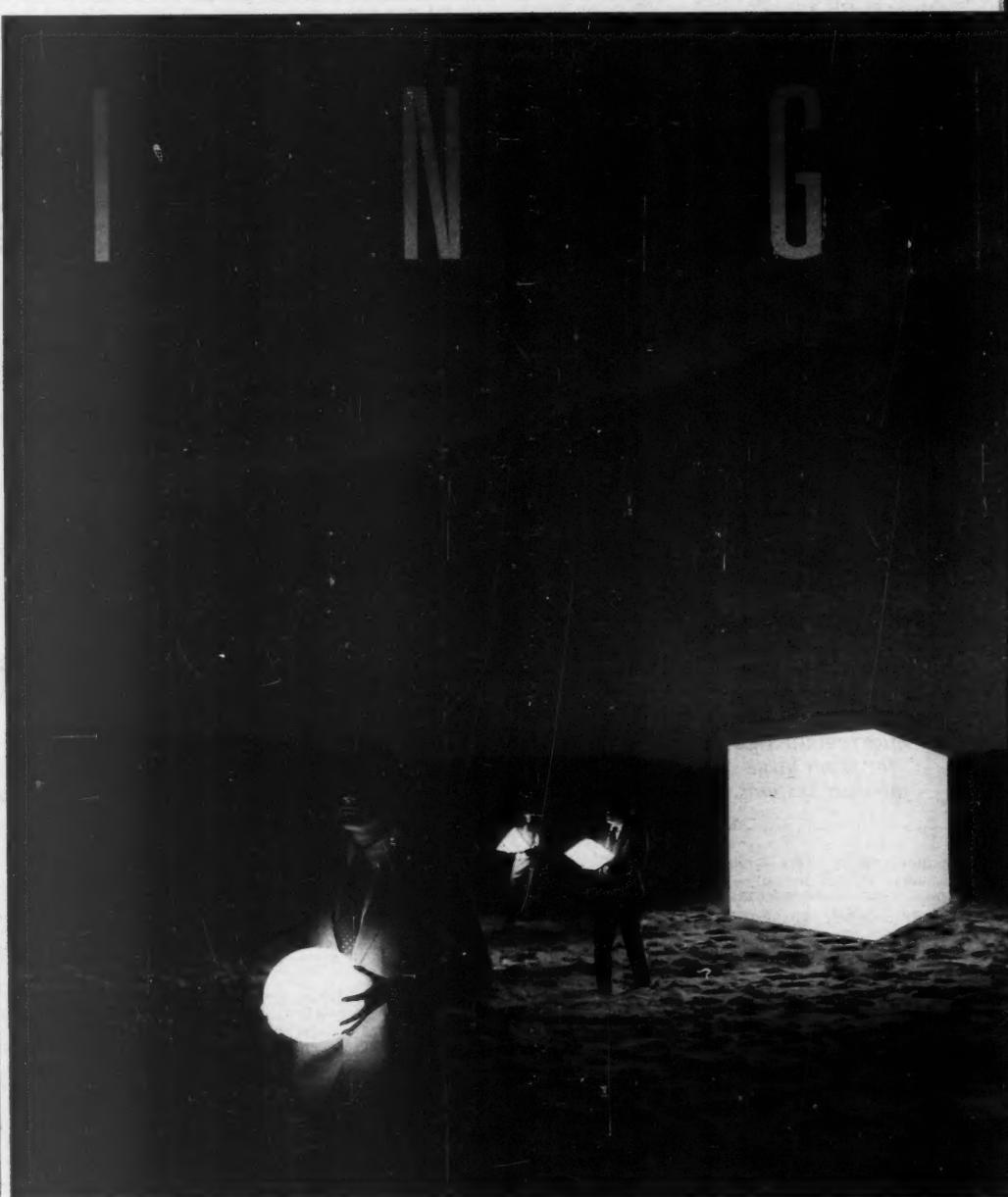
overall corporate plan.

Once an organization decides to acquire a tool, corporate management should inform end-user departments of the tool's intended use and invite end users to participate in the upcoming implementation.

**A**nother key to success lies in understanding the implementation's purpose.

That purpose is to use acquired software tools for solving business problems and meeting business needs — not to bring in new technology so it can proliferate beyond control.

An organization may, for example, address a short-term problem — an unusual reporting requirement, perhaps — with a tool that the firm fully expects to become obsolete within a few years, such as a simple microcom-



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puter data base program.

The tool is appropriate to the specific business need, but its unrestricted use poses some risk. If users put the tool to other tasks, they may develop an unhealthy dependence.

When the tool becomes obsolete and the organization wants to drop it, these users will stand opposed.

On the other hand, a tool that an organization installs as a solution for a short-term

problem may sometimes merit long-term use.

This is especially true if the tool grows or evolves, and the business need continues longer than originally expected.

Some companies that originally purchased Lotus Development Corp.'s 1-2-3 simply for its spreadsheet capabilities have discovered, for example, that the product's macro language

*Continued on page 54*

By LINDA SHAFER  
AND DON SHAFER

**R**egardless of the wealth of commercially available microcomputer software, occasions arise when microcomputer users need to develop custom applications.

Software that is developed on microcomputers, however, is trouble prone and not always the productivity booster for which the developers hoped. Custom-developed microcomputer software commonly lacks the following:

- Proper documentation and adherence to software

engineering standards.

- Adequate backup and recovery procedures.

- Use of an ANSI-standard compiler and use of an extensive runtime library during development.

- A standard access route to corporate data dictionaries and standards for the use of the corporate data once it is downloaded.

## Avoid custom development snags

**O**ne way to avoid the problems associated with custom-developed software is to form a specialized microcomputer software staff to be responsible for quality control.

It is the responsibility of this staff to check user-built microcomputer applications for adherence to software engineering standards prior to the application's use in a production environment.

The staff also stays abreast of networking and communications techniques, compilers and tools and programming languages. In addition, the staff is responsible for tracking versions of packaged software that need physical distribution controls.

A microcomputer software staff ensures that custom-developed microcomputer software follows standards for ease of distribution, installation and maintenance and that the use of corporate data conforms to a companywide standard or template.

In addition, this department can be charged with providing a central place for keeping up with hardware developments, new vendor-supplied software and the backup of hard disks.

The purpose of this group, in effect, is to soften the impact that software from untrained and inexperienced developers has on corporate computing.

The group does not impede progress, yet software growth proceeds in a controlled manner.

This small cadre of specialists assume the responsibility for software standards, data integrity and access.

Their efforts improve communication among corporate staff members and assure management that critical microcomputer programs developed by the user community are maintainable.

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*The Shafers are staff members at the Los Alamos National Laboratory in Los Alamos, New Mexico. Linda is co-writing a book, *The Professional User's Guide to Buying Software*, which Van Nostrand Reinhold Co. expects to publish this fall.*

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## Here's How Information Services And International Distribution Made It Happen



*"Thanks to TELON, the new international on-line order entry system was completed six months early and within budget."*

Ben Wolf  
Director of Commercial Systems  
Travenol Laboratories, Inc.

*"Three years ago, my department received the mandate — create a new, international, on-line order entry system and deliver it within six calendar months. We calculated a minimum of twelve calendar months to build the system at a cost in excess of \$115,000 using traditional development methods. The solution? TELON...the applications development tool that doubled our productivity almost immediately.*

*"The TELON pilot project created 50 IMS DB/DC programs, including order processing, on-line maintenance, billing interface, and invoice review. With a 2-to-1 productivity increase from detail design through string test, TELON delivered complex applications in record time and brought the project in with savings in excess of \$60,000. The users, as expected, were delighted.*

*"In the three years since we installed TELON as the shop standard, we've added more than 700 IMS DB/DC programs to our production library and increased our maintenance productivity to about 5-to-1. TELON's powerful features fit our MVS/XA environment, and it even generates COBOL code and reusable MACRO statements. Training is rapid, and so is staff acceptance. In fact, the work itself is more interesting, challenging, and pleasant since TELON has been installed. With TELON, we have doubled our productivity without compromising commitments to existing systems and techniques we know have worked well.*

*"The benefits of working with TELON are substantial. Detail design, coding, and testing are reduced, so our overall timeframes are compressed by at least 50%. With quicker delivery of improved systems by smaller project teams, TELON has delivered a productivity payback that's corporate-wide."*

*"With TELON, we're doing more with less."*



*"We now process orders five times faster...and the reduced inventory overhead means the system paid for itself in just four months."*

John Helgesen  
Director of International Distribution  
Travenol Laboratories, Inc.

*"Travenol ships over \$200 Million in health care products to 96 foreign countries every year. When the world is your marketplace, the logistics are staggering. My department is called upon to coordinate inventory, order entry, shipping, language and currency translation on a daily basis. Under the old system, the pressure was enormous.*

*"Working with Ben's group on the TELON pilot project, we created the optimal solution — an order processing system that lowers inventory and overhead. Here's how it works: About 9:00 a.m. each workday, our computer connects with our agent at the port of departure. The program extracts the necessary paperwork, books the cargo, and even electronically files the declaration with the Commerce Department. The system also prepares documents in Portuguese, French, and Spanish...and it computes the prices in escudos, francs, and pesetas, if necessary.*

*"The payback was as timely as the operation we created. The entire system paid for itself in four months...and since that time, it has paid for itself many times over. With the TELON pilot project, I've documented savings of \$1,100,000 in personnel, inventory, and operations in one year. Order processing time from our subsidiaries and foreign customers has been reduced from five working days to just one. We've enhanced our ability to support the priorities of other divisions, as well as the company as a whole. The TELON pilot project has energized my department and boosted morale throughout our international network.*

*"Systems created with TELON enable us to make the best organizational use of information...and now there's no limit to what we can accomplish."*

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March 13, 1986	Portland, Oregon
March 14, 1986	Los Angeles, California
March 18, 1986	Oak Brook, Illinois
March 19, 1986	Dallas, Texas
March 19, 1986	Hartford, Connecticut
March 20, 1986	Houston, Texas
March 26, 1986	Saddlebrook, New Jersey
March 27, 1986	Rochester, New York
April 15, 1986	New York City, New York
April 16, 1986	Seattle, Washington
April 17, 1986	Salt Lake City, Utah
April 19, 1986	Chicago, Illinois
May 14, 1986	San Francisco, California
May 21, 1986	Hartford, Connecticut
June 10, 1986	Morristown, New Jersey

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## Executive Report/Applications Development

**Continued from page 51**  
supports useful applications development as well.

□ □

## Keeping technology in perspective

Keeping technological advancements in perspective with development goals poses a real challenge to managers of applications development.

When a new product or new technology gets announced, the manager worries that his current development projects may be technically obsolete. When his talented DP employees leave to work at a firm that implements state-of-the-art technology, the manager's worst fears seem realized. Questions of technical obsolescence become a burden and a nightmare.

These reactions are stronger than the situation merits. True, no manager wants to develop a corporate system that is obsolete before its implementation, but many managers simply do not keep their fear of technological advancements in perspective. Some managers go so

“ ”

*Some managers develop an obsolescence syndrome, a fear that their skills are no longer current. This fear leads to self doubt, which helps no one — not the manager, not his firm.*

far as to develop an obsolescence syndrome, a fear that their skills are no longer current. This fear, in turn, leads a manager to self doubt, which helps no one — not the manager, not his firm.

Systems development managers who find themselves doubting their abilities should take a lesson from their counterparts in software maintenance.

Managers of software maintenance functions often shoulder accusations of not being technically current. But these seasoned professionals shrug off their detractors' comments. Maintenance managers realize that most of today's hot new software will lose its popularity as time passes. They know, too, that their talents will never lie idle; every development tool will require their support sometime down the road.

Applications development managers must recognize one double-edged fact: Not all technology is obsolete, yet

any technology faces a chance of obsolescence. If a development manager anticipates each application's life expectancy and implements new or old technology according to the relative risks, he can do little more and should try to relax.

Sometimes quantum leaps in technology such as the emergence of microcomputer spreadsheet software warrant a reevaluation of system development goals.

Managers should keep themselves open to the possibility of redirecting a project in those cases. It is not wise, however, to impede system development projects each time development technology advances.

In addition to keeping a personal perspective on technology, the development manager should also help end users and corporate

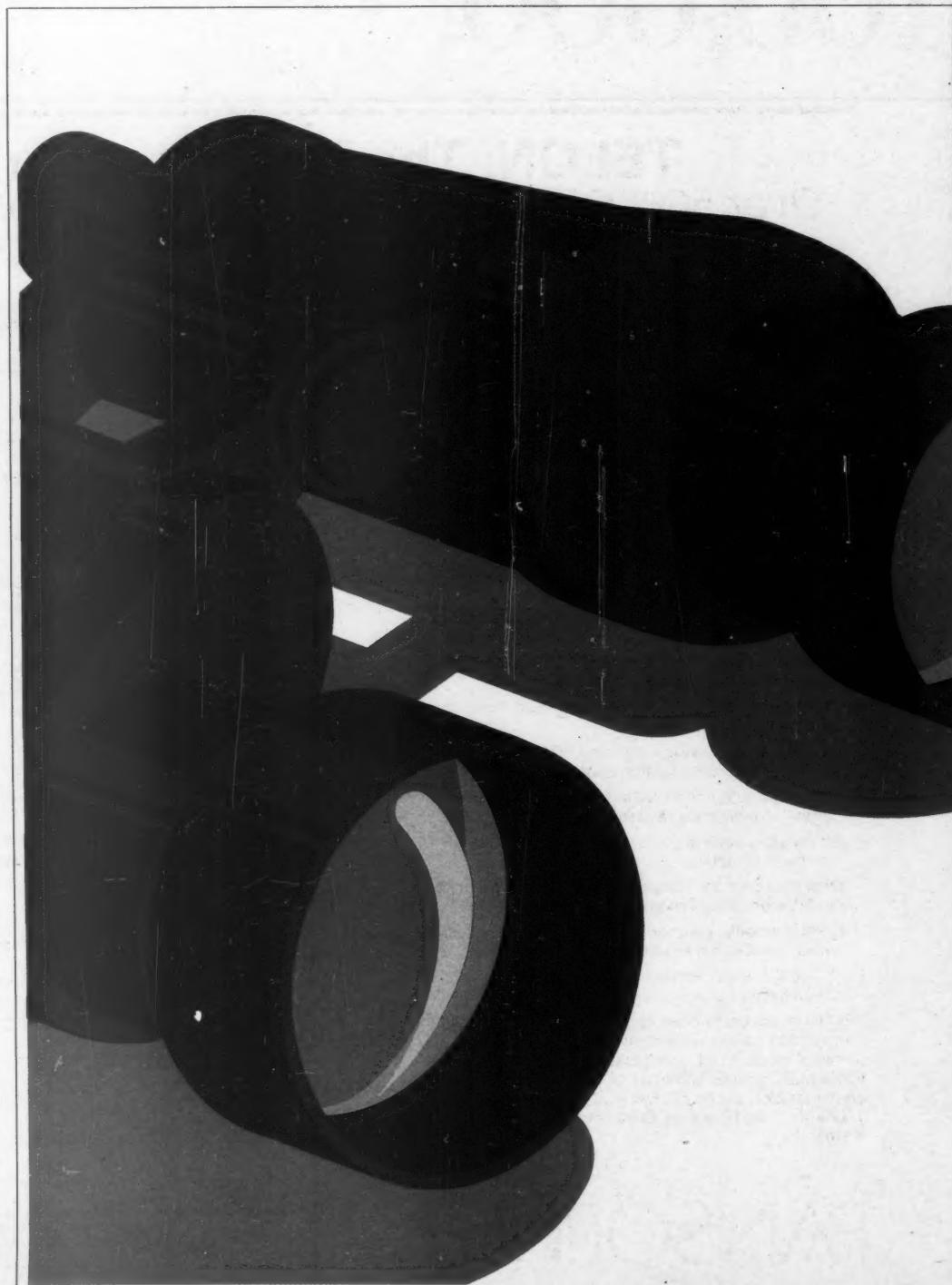
managers balance the promises and risks of technological development.

End users are no longer naive about computer technology. They can see the productivity that is possible with spreadsheet packages and menu-driven microcomputer data bases, and they may have used fourth-generation languages in a previous job.

Inevitably, they hold opinions about software

tools and vendors. Likewise, most upper managers have worked with computer-based systems — some successes and some failures. They therefore harbor strong biases of their own.

These knowledgeable people outside of the DP community are privy to announcements of fourth-generation languages and other tools, which raise their expectations — sometimes impossibly high. Users and



## Executive Report/Applications Development

managers then pressure the system development manager to act.

When questions of control arise, these users and managers no longer give in to pressures from the DP organization. Rather, they take a very active role in and responsibility for the systems. And that's as it should be.

The development manager should caution corporate executives about premature use of new technology but

should remain flexible in his convictions. When a new technology purports to provide greater power and control for end users, the system development manager may have to compromise so as not to alienate these important constituents.

Quite clearly, problems like end-user autonomy and premature obsolescence make system develop-

ment a complex task, despite the common belief to the contrary that the task gets easier as technology advances. Compared with the relatively simple world of 10 or 15 years ago, today's development environment is terribly complex.

Development managers face advanced business requirements and must choose among a variety of development methodologies and a vast set of tools.

The vendors that develop new products deserve commendation for their contributions, but the technical and business communities cannot continue to praise blindly each new development. User organizations and their vendors need to address the practical problems that a company encounters as it applies new tools to the development of business systems.

The impact of new tech-

nology is felt throughout the entire business, and responsibility for coping with it must spread throughout the company as well, with corporate managers, end users and applications development managers all playing a part. Recognizing this is the first step toward strengthening the use of new products and developments. Finding new techniques, such as the corporate plan for new technology, is the next step.

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### Books, seminars offer further information

Readers who want to learn more about applications software development may find the following publications and events helpful.

#### Publications

**Application Development Without Programmers.** James Martin. The Telecom Library, New York, N.Y. 1982.

**Application Prototyping: A Requirements Definition Strategy for the '80s.** Bernard H. Boar. John Wiley & Sons, Inc., New York, N.Y. 1984.

**Fourth-Generation Languages, Volume 1, Principles.** James Martin. Prentice-Hall, Inc., Englewood Cliffs, N.J. 1985.

**Productivity Management in the Development of Computer Applications.** John F. Keane, Marilyn Keane and Mark Teagan. Prentice-Hall, Inc., Englewood Cliffs, N.J. 1984.

**Programming Productivity.** Capers Jones. McGraw-Hill, Inc., New York, N.Y. 1986.

#### Events

**MAY 5-8, WASHINGTON, D.C. — Environments for Productivity and Quality Enhancement.** Contact: Victor Balsili, Department of Computer Science, University of Maryland, College Park, Md. 20742.

**OCTOBER 15-17, WILLIAMSBURG, VA. — Sixth Composium on Reliability, Distributed Software and Data Base Systems.** Contact: Edwin C. Foudriat, Department of Computer Science and Engineering, University of South Florida, Tampa, Fla. 33620.

**NOVEMBER 17-19, BRECKENRIDGE, COLO. — Third International Workshop on the Software Process.** Contact: William Riddle, P.O. Box 3521, Boulder, Colo. 80303.

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## In Depth

# Pushing AI into the mainstream

## *Symbolics, Inc. finds corporate success outside the lab*



**By 1990, knowledge-based advisory systems built and delivered on symbolic processing machines will be 'the ground floor, even in general-purpose computing. That's a trend that I'd say is unstoppable at this point.'**

— Russell Noftsker  
Chairman, Symbolics, Inc.

By ERIC BENDER

**T**his was never your typical computer start-up. Five years ago, Symbolics, Inc. was a handful of artificial intelligence laboratory alumni busily wiring together a prototype system built with a radical symbolic processing architecture. From a business plan viewpoint, the founders' primary goal was almost as radical as the machine: They sought to move symbolic processing technology in general, and LISP-based systems in particular, from the lab into general commercial use.

Today, with software vendors and corporate in-house developers busily creating knowledge-based systems and other LISP-based packages, the market for symbolic processing hardware and software has blossomed. Symbolics currently employs more than 700 people and is breaking through a \$100 million annual sales level.

"Before Symbolics, there were no LISP machines," says Harvey Newquist, editor of the "AI Trends" newsletter, published in Phoenix. "The company literally created the LISP market."

And then, Newquist notes, they held on to it. He estimates Symbolics now takes approximately 55% of the overall market revenue, about three times that of the nearest competitor. Symbolics Chairman and Chief Executive Officer Russell Noftsker suggests that the figure is closer to 70%.

In technology, the dominance is more complete, most AI industry observers agree.

"Their technical lead is secure," says Curt Monash, senior vice-president at Paine Webber, Inc. "Their technical organization is probably the best in the world for any company remotely resembling that size."

Symbolics executives are not shy about claiming this advantage. "This building is really the mecca of symbolic computing," explains Ernest Godshalk, vice-president and chief financial officer.

*Bender is Computerworld's senior editor of microcomputers.*

cial officer. "There's only one place in the world that anybody who's really serious about symbolic computing would want to work, and you're in it."

But the market that Symbolics pioneered is shifting, as the first crop of commercial expert systems applications appears, the means of delivering those applications to users receives greater attention, general-purpose machines are equipped with better symbolic processing software and larger vendors take a few steps further into the field.

"Symbolics has gotten to where it is by having some of the best and the brightest in new technology, and it has taken the hard road," comments Philip Cooper, president of Palladian Software Corp. in Cambridge, Mass.

But while Symbolics established itself by building very sophisticated development products for customers who did not care that much about price, the recipe for success will not stay that simple. "All those rules are changing," Cooper says.

### Starting in the lab

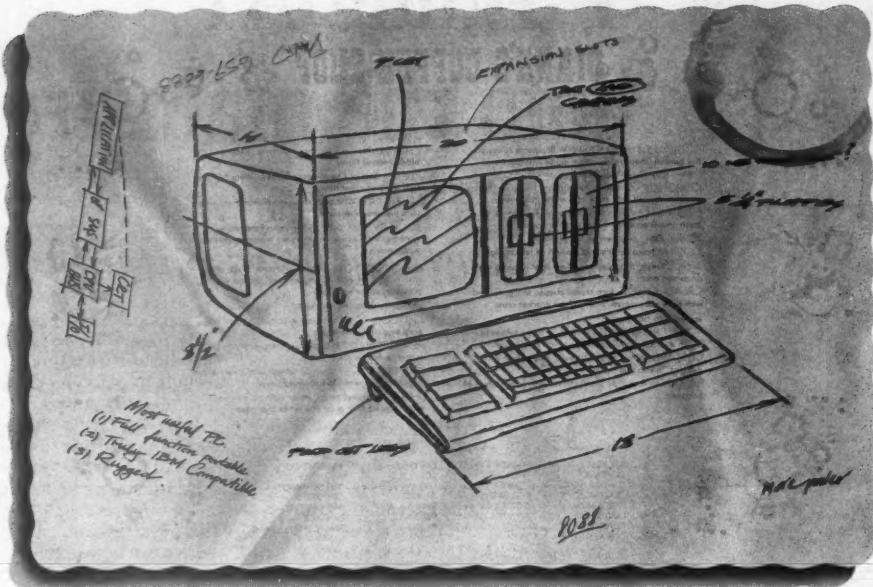
Symbolics' roots go back to a group of researchers at MIT's Artificial Intelligence Laboratory, who in the late 1970s were working on a single-user machine optimized to run LISP programs but were faced with shoestring research budgets.

"The history at MIT has been that although the funding was generous for research purposes, it was almost nonexistent for something that required a major capital infusion, such as this," according to Noftsker.

After managing the AI laboratory from 1965 to 1973, Noftsker left the following year for California, where he founded a successful supplier of computerized spot-welding equipment. Visiting the MIT AI lab in the summer of 1978, he found his colleagues trying to figure out how to produce the new machine.

"I went and talked to a bunch of computer manufacturers, including Wang Laboratories, Inc., Digital Equipment Corp., IBM and Xerox Corp., and no one was interested in manufacturing the machine because there was no

# From a pie shop



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## In Depth/Symbolics, Inc.

market for it," he recalls. The group then decided to create a start-up.

"Several of us had been involved in artificial intelligence for a long time, and we felt that this was an important step in disseminating the current leading-edge technology and research," Nofsker says. "We had enough business experience and insight to realize that this was a commercial opportunity and that it could succeed."

They were faced at first with the difficulties of getting a solid consensus within the group on how the start-up would be formed. A running controversy with one key figure, Richard Greenblatt, created considerable bitterness and postponed the formation of the company for almost a year.

Once Symbolics finally was under way in 1980, "we could move rapidly in product development," Nofsker says. He notes that the technical staff "had all been product-oriented for a long time and had worked together closely." The firm also hired several managers with experience at larger companies.

## Rocky venture capital road

The original bankroll came from Nofsker and two other cofounders. In 1981, Symbolics began a trip among venture capitalists that turned into a long and tortuous journey.

One problem was that there was no market for LISP. "It was a speech defect," Nofsker says. "Everybody was skeptical."

Another, in his view, was venture capitalists themselves. "Very few of these venture capital investors can make decision on their own," he explains. "They're like sheep: They all mill around until one of them wanders in one direction, and then all the rest of them turn and run after him. . . . It wasn't like we were trying to fleece them. We were as honest as we could possibly be."

While Symbolics did go successfully to the venture capital well several times, it found itself arguing with its backers about the first-generation machines it was producing in California.

The backers wanted Symbolics to build only enough machines for internal use and to move the production facility back to Massachusetts.

Symbolics management disagreed on both counts. "That was a battle that never was quite resolved," Nofsker says.

Then, as development cycles lengthened, "the backers were calling us every few days to say, 'Have you paid the payroll?'" Nofsker says. "We had no money to pay the payroll. They were waiting for us to go bust be-

cause the [stock] price would come down."

## Aggressive marketing

As these struggles continued, Symbolics began delivering its first product, the LM2, in September 1981. The firm built 83 of these machines before shutting down the line in March 1983.

"Symbolics, early on, was very aggressive in marketing," Newquist explains. Among the reasons for the product's success, he adds,

**Howard Cannon 'took the machine in its incomplete state to the factory and, just by sheer force of personality, made four of them work in December. We shipped the four.'**

— Russell Nofsker  
Symbolics, Inc.

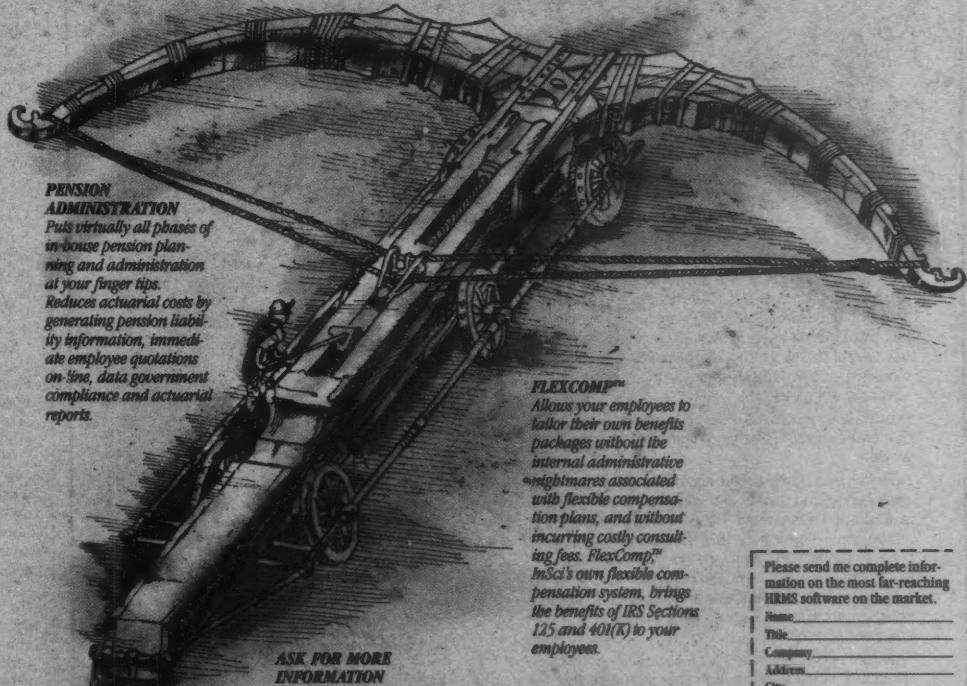


Cannon, marketing director

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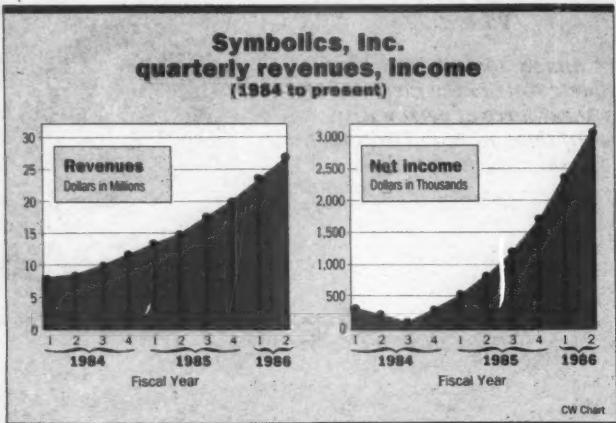
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was that the firm hired computer salesmen who were experienced in large corporate sales. "They didn't bring engineers to knock on doors."

The plan was to ship the next-generation machine, the first in the Symbolics 3600 line, by early summer 1982. "It was a very aggressive product development," Nofsker notes, and the schedule slipped first to November 1982 and then to March 1983.

"I knew the money couldn't be stretched that far," Nofsker says, adding that Howard Cannon, now marketing director, "took the machine in its incomplete state to the factory and, just by sheer force of personality, made four of them work in December. We shipped the four."

By June 1983, Symbolics was delivering 50 machines per month, with a backlog exceeding \$15 mil-

lion, and the cash crunch was over. The company subsequently raised almost \$50 million in two public offerings, the first in November 1984.

Since introducing the 3600 line, Symbolics has enhanced it with a steady series of new models, hardware and software upgrades and communications links. Later this year, the company is expected to take its next big product step by announcing and shipping a low-end model carrying a \$30,000 price tag, about half the cost of standard models, and designed to deliver, rather than develop, applications.

Among customers today, "very few are delivering applications, and those few are delivering to non-cost-sensitive channels," Nofsker says. He also emphasizes that delivery systems will need to provide full high-end capabilities if they are running "highly interactive applications where the knowledge base is evolving."

The new machine will allow Symbolics to keep ahead of the demand for delivery vehicles, he says. "That product and its successors will allow us to remain the leaders in our market, in spite of everything that we know from IBM or Sun Microsystems, Inc. or DEC or Apollo or Texas Instruments, Inc. or Xerox."

## LISP machine competition

While the price/performance of LISP machines is improving steadily, some high-end systems still sell for more than \$100,000 with software. Symbolics has an installed base of about 2,000 machines.

Its main competition today is LISP Machines, Inc. (LMI), which holds an 18% to 20% market share, and Xerox Artificial Intelligence Systems, with a 12% share, Newquist estimates. TI "is just getting started," he says. LMI's idea is to get a multiuser machine out there, he adds; the company has done well with aerospace and government clients.

While Nofsker dismisses LMI as a relatively negligible factor, Cannon notes that "LMI has risen from the ashes enough times in the past" to make that view risky.

"Xerox has always been the big threat but was never quite able to get its act together," Nofsker says. "Xerox continues to do some good things. . . . It just still is not getting the kind of volume we are. I've always thought that the primary reason it doesn't is that performance is such a big issue in this market."

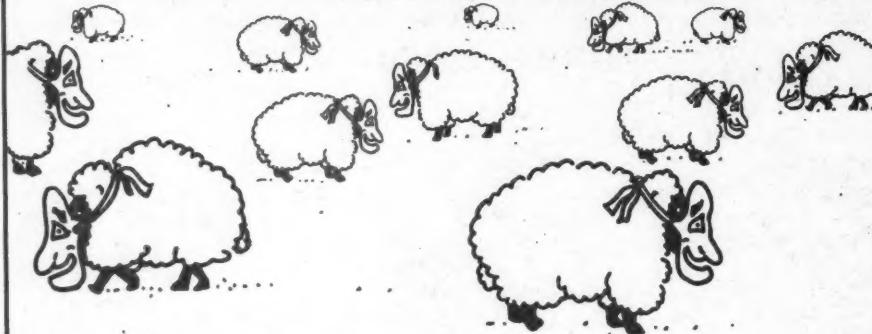
Symbolics executives keep a wary eye on TI, whose entire Data Systems Group is heavily promoting AI technology. In their view, TI's threat is not in the technology but in aggressive pricing that might destabilize the market.

From a technology standpoint, there may be less to fear from startups than from most segments of the computer industry, outsiders note. A LISP machine is an environment, representing hundreds of man-years of specialized software development, Palladian's Cooper points out. "It's not simple like an IBM Personal Computer clone; you can't go buy Microsoft Corp.'s MS-DOS and be on an equal basis."

Symbolics' Godshalk observes, "We're viewed as having established some fairly significant barriers to entry in this market — not only in the technology, the market share and the lead time that we have, but in

Continued on page 62

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## In Depth/Symbolics, Inc.

## Symbolics R&D: A next wave

Symbolic processing — which manipulates symbols representing real-world objects, their properties and the relations between them — can address many nonnumeric tasks that general-purpose computing cannot handle, but it tends to place heavy loads on the processor.

Dedicated LISP machines, such as those that Symbolics, Inc. and its competitors build, throw large amounts of memory and disk storage, powerful CPUs and specialized architectures at this problem.

"In our systems, memory is managed by object, or by character string, if you will," Symbolics Chairman Russell Nofsker says. The system is designed to grab the strings, rather than conventional blocks of memory, he adds.

In addition, while processing is going on and the strings are in memory, they can be tracked in the dedicated machine's hardware and discarded when no longer needed, Nofsker says. General-purpose systems continually reexamine every word of memory to check if it is referenced elsewhere — a job that creates tremendous overhead when running symbolic processing software. Dedicated systems reduce the "garbage collection" overhead from 50% to 5%, he says.

Symbolics' 3600 line is composed of 36-bit machines that can be expanded beyond 30M bytes of physical memory, provide 1G byte of virtual memory and execute most

simple LISP instructions in one machine cycle.

Like its competitors, Symbolics is moving toward custom very large-scale integration designs and investigating parallel processing configurations, Nofsker acknowledges. "Of course, Symbolics is moving in the direction of some parallel architectures, and everybody is hopeful that some of the hard problems will be solved."

"Right now, almost any computer architect can sit down and design a parallel processor; that is easy. But so far, nobody has really solved the problem of how you get  $N$  times performance for  $N$  times processors when  $N$  gets bigger than about eight."

While the hardware continues to improve, "the way you are really going to distinguish yourself is by the nature of the software," says John Kulp, Symbolics' vice-president for research and development.

Until recently, Symbolics was busily following through on a set of symbolic processing concepts born at MIT in the late 1970s, Kulp says. "For most of the first four years or so, the company was involved with taking those ideas and ... making a commercial system that supported various network and language standards. Approximately a year to 18 months ago, we started asking ourselves, 'What's the next wave?'"

Currently, Symbolics is pushing ahead on two fronts, he says. The



Kulp is vice-president for R&D.

first is examining how to address the problems that arise when data is represented in various ways in various computing environments.

"In the context of AI, you want to have large knowledge bases that are stored and shared over long periods of time and have the nice data-independence properties that relational data bases are noted for," he says.

"The other major thrust is in the user interface area," Kulp says. As an example, he mentions "a model where every single thing I type out anywhere, on any screen, has intelligence behind it, and it is remembered why that was typed there and what it was trying to do. And anytime, I can go back to any piece and ask things about it and poke at it and get some behavioral action from it."

— Eric Bender

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Continued from page 60  
that there is a real sort of magnetism in this business."

Symbolics also has invested some \$175 million in development, he adds. "While that's not a huge amount of money for some of the larger competitors, it's quite prohibitive from a start-up point of view."

### Mainstream competition

As the market for developing and delivering AI applications grows, mainstream computer vendors are attacking it more aggressively. Among these, DEC is likely to pose the greatest challenge to Symbolics, Nofsker says.

DEC has a strong internal artificial intelligence development effort, a huge installed base, a credible version of the emerging Common LISP standard and a powerful and inexpensive machine in the Microvax II, he acknowledges.

Previously, with VAX systems, "the price/performance differential favored us so strongly that DEC was just buying time, planning defensive actions. Now that it has the Microvax, the picture is a lot different. DEC is still not anywhere close in terms of performance and programmer productivity, but it is definitely making progress in that direction," Nofsker says.

Looking at future market leaders, "if I were to name two companies, they would be DEC and Symbolics, and I'm not sure which order the two would be in," Paine Webber's Monash says.

Like everyone else in the industry, Nofsker also worries about IBM, although he remarks that "what I

know about it says I shouldn't worry." AI-related products from IBM "never have had much in the way of success," he adds. "The products allow customers to dabble in the technology and convince themselves that they're up to date."

Potential challenges also will come from Hewlett-Packard Co., Sun Microsystems, Apollo and other suppliers of general-purpose computers.

With these companies "beginning to shift into Symbolics' market, it's now important for Symbolics to stress the capabilities of its software," according to Newquist.

While the advantages of lexically scoped debuggers and other esoteric AI development software may be difficult for the uninitiated to grasp, there are two clear signs of Symbolics' software strength: the dozens of third-party programs available and the web of development and/or marketing agreements with other vendors.

The AI industry today is a boiling pot of cooperative efforts, "and often the center of that boiling pot is Symbolics," Newquist explains. "The software vendors all have agreements with Symbolics."

### Planning for long-term growth

"Our financial results are fairly predictable; all you need is a French curve, and you can figure them out," Godshalk says.

In the quarter ended Dec. 29, Symbolics posted revenue of \$27.6 million and net income of \$3.1 million (see chart page 60).

"We have been growing roughly 70% a year, and we have a well-communicated financial objective to continue to grow revenue in excess of 50%," he adds.

Another goal is "to increase profitability to a level that is appropriate for a company that has a fairly dominant position, both in the technology and the marketplace, which would be something like 8% to 10% fully taxed."

Most of the money raised in the public offerings is still in cash reserves, Godshalk explains.

"We have not chewed into those reserves heavily, which is a little surprising for a company growing this fast. On the other hand, however, our profitability is increasing very rapidly," he says.

### Growing pains

As always when a company grows so quickly, problems arise, with one of the most annoying ones being the need for more space.

"It's going to get worse for the next couple of months, and then we'll occupy a new building, and everybody will have a chance to relax a little bit," Godshalk said.

The firm will move its headquarters to Concord, Mass., and keep its research and development group at the current location near MIT.

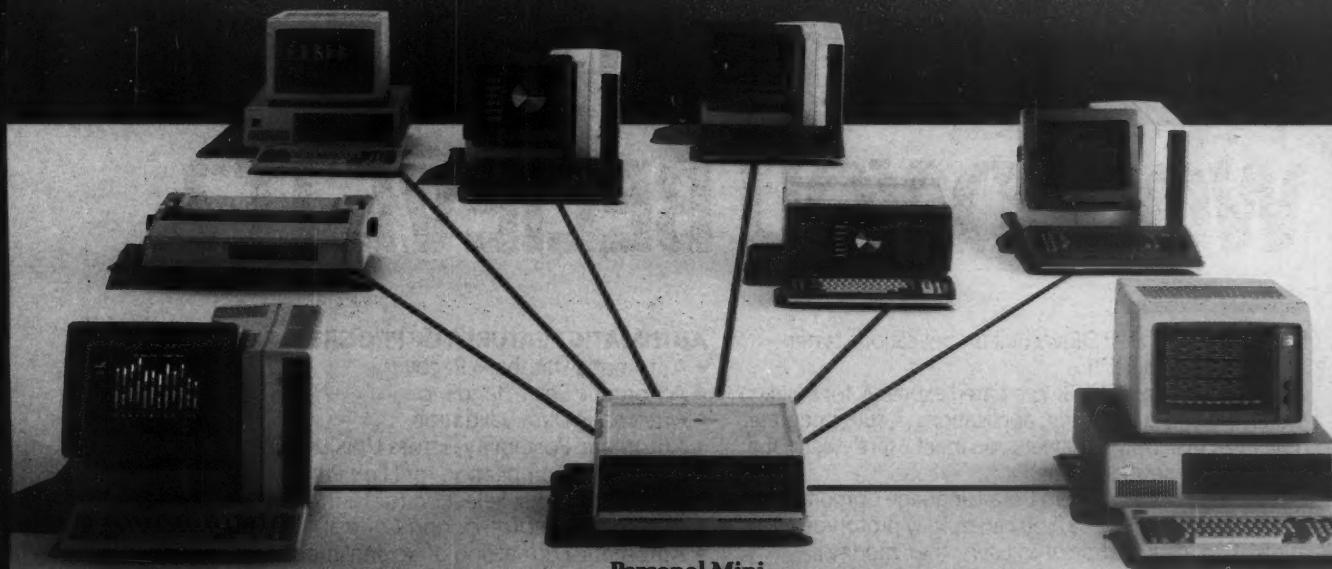
"At any given point in time, about 40% of the people that work here didn't work here a year ago," Cannon remarks. "Our turnover has been virtually zero in terms of people that we didn't want to lose."

### Learning to be large

Primarily because of size, "Symbolics is not as flexible as they were two years ago," Newquist says. But he and others agree that the company is making a good effort to tackle the problems of growth.

"I see its challenge as learning to

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## In Depth/Symbolics, Inc.

be a big company," Palladian's Cooper comments. "It's wrestling with that. So far, it's doing quite well."

"I'm not concerned about managing growth because it has done a very good job integrating people into the organization from larger companies," Monash says.

Most recently, Symbolics hired Bruce Rusch, whose previous experience included running large manufacturer of programmable controls, as vice-president of marketing and sales.

This move should aid Symbolics' marketing, "which clearly needs strengthening," Monash notes.

As one sign of increased confidence in the firm's management depth, last month Nofsker began to fulfill his long-delayed wish of learning to fly a helicopter.

"As we get more good manage-

ment people like Bruce in, we are able to take the other visionaries in the company and get them more involved in the long-range planning process," Nofsker adds.

"Just in the last two or three months, we have started ramping up a fair amount of effort in long-range planning," he says.

Of course, the company's long-

term prospects hinge directly on how quickly symbolic processing technology is accepted in the marketplace and how broad its reach becomes.

There are many in the industry who point out how slowly artificial intelligence promises have become reality. These people predict that dedicated AI systems will remain a niche market.

The counterargument, Cannon says, is that "a couple of successes in this technology that give somebody a qualitative advantage will blow this whole thing open. That's going to panic people."

Such an explosion could come as quickly as it did in computer-aided design and manufacturing, which Cannon views as one of the two most promising near-term opportunities for symbolic processing — the other being applications for financial service firms.

"It's only a question of time — five or 10 or 20 years — before symbolic processing takes over the computer market," Monash predicts.

"There's a fundamental race here: Symbolics has to become a mainstream computer company before the mainstream computer companies become effective in its technology." ■

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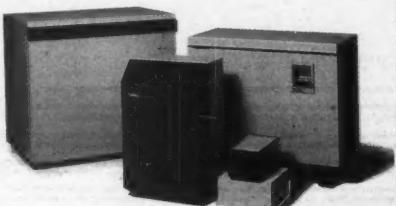


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## Nofsker views trend toward advisory systems

By 1990, knowledge-based advisory systems built and delivered on symbolic processing machines will be "the ground floor, even in general-purpose computing," predicts Symbolics, Inc. Chairman Russell Nofsker. "That's a trend that I'd say is unstoppable at this point."

"Commercial users of computers right now are primarily managing and digesting the records of business — processing those records. A lot of what goes on is aimed at enhancing management's understanding of the records and transactions of business," he adds.

As time goes on, more and more knowledge will be applied to that process via machine, he emphasizes.

According to Nofsker, the trend is toward a point at which the computer systems "can serve as information advisory systems, where they're actually drawing conclusions and telling you what's going on in your business as opposed to just running out reams of paper that you have to dig through and understand. I think that business wants to go in that direction."

### DP preparations

So how are DP shops bracing for the transformation?

"Just in the past nine months, they are beginning to buy into it," Nofsker remarks.

He notes, "We've started seeing the MIS departments actually go looking for these kinds of capabilities and trying to figure out how they could take advantage of them."

Nofsker suggests that DP search out those areas in which to provide expert advice and knowledge support to their company management. "And then start implementing those support capabilities before your management comes in and says, 'Why don't you guys have this?'" ■

— Eric Bender

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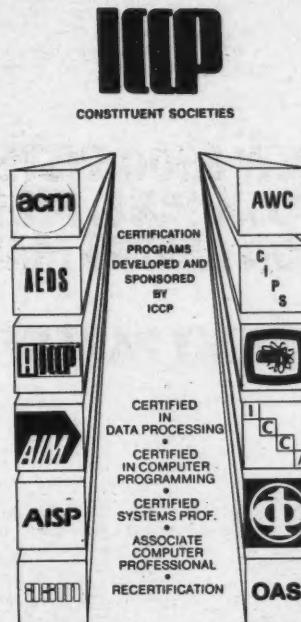
### **When Are Exams:**

Two examination sittings are held in 1986. There is a May 10, 1986 examination, with application deadline of April 1. There is a November 8, 1986 examination, with application deadline of October 1.

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#### **Recertification Is Available Now**

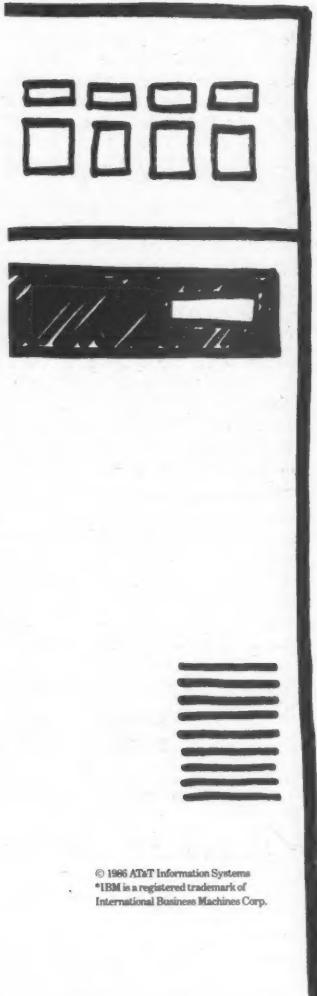
The CDP, CCP and CSP programs require that successful candidates recertify their professional skills every three years. The ICCP recertification process may be accomplished by either retesting or through earning Continuing Education Units (CEUs) as approved by ICCP.

**Study Guides Available**

Official ICCP Study Guides for each of the programs may be purchased directly from ICCP. The cost is \$15 per copy for the CCP, CDP and CSP Study Guides. The ACP Study Guide is \$12.50 per copy. Please, in US or equivalent funds.

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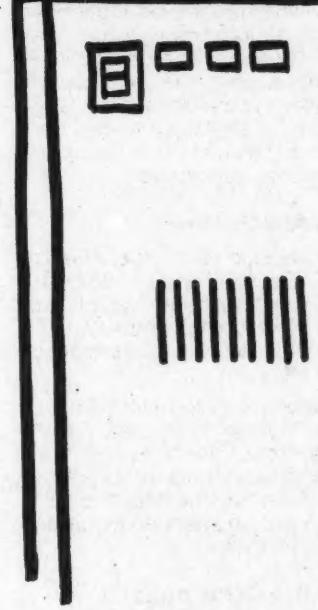
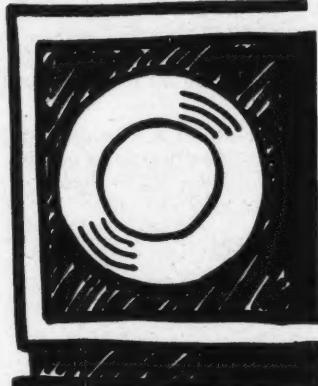
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## In Depth

# High-performance telework helps companies compete



**To understand the potential available with telework, you have to step up to a whole new companywide perspective. Telework is a different way of communicating — so dynamic that it pulls office automation along in its wake.**

## Part 2

By THOMAS MILLER

**I**n many large organizations, what began as after-hours troubleshooting in DP departments is now becoming full-time "telework." New high-performance job applications are emerging that allow work to be done from home or, literally, from any place.

The need for increased productivity and effectiveness, stimulated by a competitive environment, encourages workers to turn to computing — an electronic desk upon which they can manage all of their tasks. As non-DP personnel discover the benefits of this "virtual desk," corporate dependence on DP increases, and the system becomes the heartbeat of the organization.

Telecommuting is a critical part of the evolving union of computers and communications. DP, MIS and telecommunications managers are learning that in telework, as in other growing user applications, the emphasis often focuses more on the work that needs to be done than on the technology — provided, of course, networked systems do what they are supposed to do.

Two classes of benefits move managers to consider whether any of their own business problems can be addressed with telecommuting.

For employers, these benefits include the following:

- Improved productivity, both quantitative and qualitative.
- Cost savings on retraining, recruiting and office space.
- Optimized use of DP, office automation and telecommunications resources.
- Faster work movement and executive responsiveness.
- Individual, high-quality work output.
- International time-independent networking applications.
- Wider employee retention options.
- Expanded labor pool and recruiting options.
- Less absenteeism for illness, injury

*Miller is director of research for New York-based Electronic Services Unlimited (ESU). ESU provides consulting, training and research services in the telework field and publishes "Telecommuting Report," a monthly newsletter.*

or personal reasons.

Employees find the following benefits in telecommuting:

- Fewer distractions, more concentration at home.
- Ability to stay in touch with important work at all times.
- Stress reduction both in work and at home.
- Greater time flexibility than with flextime.
- Personal expense savings on food, clothes and travel.
- Less time wasted commuting.
- Improved quality of life.

Results such as these are being produced in temporary and permanent telecommuting network applications that address a surprising variety of business problems, including corporate relocation, data entry costs and the loss of trained personnel.

### Competitive edge

Telework is making some companies more competitive. For example, faster movement of work, especially response time from the field, is a prime target of the telework program at Borg-Warner Chemicals, Inc. in Parkersburg, W. Va.

The company is aware that both a General Electric Co. chemical division and a group at Monsanto Co. make frequent use of field service telecommuting, according to Borg-Warner's information center consultant, Dennis Conley. Borg-Warner wants to be in the front of the trend. "Telecommuting speeds customer service and gets better answers for your customers," Conley says. "It increases productivity while saving gas."

Familiar computer benefits apply, such as elimination of messy handwritten orders, better accuracy through use of standardized forms, fewer computational errors and substantial reduction in clerical support for the field service positions.

Optimizing the use of key company personnel is the competitive goal at Peat, Marwick, Mitchell & Co., a major accounting and consulting firm in which high-performance professional-to-professional E-mail has become a major business facilitator, with telecommuting as a significant component. James Chase, director of computer services for the firm, recognizes the organizational advantages of telework.

"We are a people-to-people organization, and we are now able to draw on

## In Depth/High-Performance Telework

particular specialties within the firm in a more flexible way than ever before," Chase says.

With telework, managers, project supervisors and other specialists can reduce or eliminate meetings before client session by preparing work and exchanging ideas electronically.

Temporary management consulting groups can be formed rapidly for specific projects without regard to location and out-of-phase time zones. Coast-to-coast and international links, in particular, are more effective with telecommuting.

#### Client connections

Clients sometimes are tied in as well. Chase says data often flows from audit professionals at client sites to the Peat Marwick offices for review and analysis.

Professionals most involved with

extended client contact are the ones most likely to use telework. Personal computers are not effective for a two-hour visit, but if professionals visit client sites for a week or more, they may take a machine along.

To facilitate this, the company bought 5,000 Apple Computer, Inc. Macintoshes during 1984 and 1985. In addition, some professionals own their own personal computers.

Peat Marwick maintains some 4,500 E-mail boxes on ITT Dialcom to support this rapid movement of work. Although the number of E-mail box holders is increasing and daily messages probably surpass 1,000, Chase says, "not everyone needs a full-time E-mail box."

To keep costs down, Peat Marwick assigns just one electronic mailbox to some of its smaller overseas offices. "That way," Chase says, "We can

regularly communicate with them and overcome the typical problems of different time zones."

Interoffice telework is far more the norm at Peat Marwick than is telecommuting from home, but on any given weekend, 150 to 200 users might log on to the company network.

Chase believes the number of users has remained constant for the past year, although all 10,000 of the company's professionals theoretically could telecommute if necessary.

The firm is now working on an evaluation of the distributive processes in its various local offices as it continues to shape its OA telework strategy.

#### The security issue

Concern over competitive issues also heightens Conley's hesitation

about opening up Borg-Warner's data base to wider remote access.

"Security systems must be tight," he says. "If an employee leaves the company for the competition, we have to know immediately of his departure to prevent file dumping. We have to train employees not to leave diskettes loosely around the house and screens on for the neighbors to see. First and foremost, we have to better protect the mainframe."

These concerns are serious, but whether telecommuting really exacerbates most security risks is questionable. In fact, no serious problems have been reported in any of the programs mentioned.

Security issues, perhaps, should be more correctly viewed as problems related to terminal proliferation than to home-based telework. It is doubtful that an employee intent upon stealing a key prospect list from a company data base would be harder to stop if access were from home rather than from a device in the office.

Besides common sense procedures and basic network security support, the real issue in telework security is trust. Telecommuting does not call for more trust — it calls for intelligent assessment of trusts already in place.

Network security calls for the same assessment whether the employee is in the office or working elsewhere, and in-office solutions will not likely be that much different from telework solutions.

Nonetheless, trust is a more sensitive issue in an area of the company that faces stiff outside competition, and so the sensitive area may not be the best place to conduct a telecommuting trial.

#### Less paper

Many people have not forgotten the dream of the paperless office and now see a connection between digitization of work and the performance potential of telework. Jim Davis, vice-president of national marketing for National Business Systems, Inc., spent 25 years in the DP department of a major U.S. bank learning, as he says, "how not to automate a large organization." Finally, he left the bank to join National Business Systems, which markets Total Office Support System (TOSS), a system that runs on IBM mainframes.

From a technical standpoint, TOSS is capable of accepting documents in ASCII format, IBM Document Content Architecture final form and revisable form and binary files.

From an end-user standpoint, this kind of file transfer capability provides a new way of communicating within the organization — with telework as a routine component. Paper is not really eliminated, but communications are far less paper-based and far more flexible than ever before.

Davis is something of a visionary on this subject. "To understand the radical potential available with telework, you really have to step up to a whole new companywide perspective," he says. "It's a different way of communicating so dynamically that it literally pulls office automation along in its wake, not the other way around."

Davis considers two factors essential for a realistic OA strategy:

- Nothing significant can happen until documents are created in an

## SAS Institute Inc. Announces

### Lattice C Compilers for Your IBM Mainframe

#### Two years ago...

SAS Institute launched an effort to develop a subset of the SAS® Software System for the IBM Personal Computer. After careful study, we agreed that C was the programming language of choice. And that the Lattice® C compiler offered the quality, speed, and efficiency we needed.

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Our efforts are complete — we have a first-rate IBM 370 C compiler. And we are pleased to offer this development tool to you. Now you can write in a single language that is source code compatible with your IBM mainframe and your IBM PC. We have faithfully implemented not only the language, but also the supporting library and environment.

Features of the Lattice C compiler for the 370 include:

- Generation of reentrant object code. Reentrancy allows many users to share the same code. Reentrancy is not an easy feature to achieve on the 370, especially if you use mid-continent external variables, but we did it.
- Optimization of the generated code. We know the 370 instruction set and the various 370 operating environments. We have over 100 staff years of assembler language systems experience on our development team.
- Generated code executable in both 24-bit and 31-bit addressing modes. You can run compiled programs above the 16 megabyte line in MVS/SA.
- Generated code compatible for OS and CMS operating systems. You can move modules between MVS and CMS without even recompiling.
- Complete libraries. We have implemented all the library routines described by Kernighan and Ritchie (the informal C standard), and all the library

routines supported by Lattice (except operating system dependent routines), plus extensions for dealing with 370 operating environments directly. Especially significant is our byte-addressable Unix-style I/O access.

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With the cross-compiler, we also offer PLINKB6 and PLJB6, developed by Phoenix Software Associates Ltd. The Phoenix linker and library management facility can bind several compiled programs on the mainframe and download immediately executable modules to your PC.

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We believe that the C language offers the SAS System the path to portability and maintainability that we believe that other companies will take similar strategic decisions about C. Already, C is taught in most college computer science curriculums, and is replacing older languages in many. And almost every computer introduced to the market now has a C compiler.

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## In Depth/High-Performance Telework

electronic state and stay that way for distribution and filing.

• The electronic document transfer facility must be made a priority as a major new method of communicating and pressed into use by all of the organization's personnel, not just by a small central group.

"Out of a thousand companies," Davis says, "maybe only one or two are even in a state of mind to accept this idea." Among other things, he says, it takes a substantial commitment to a mainframe environment with full screen editing and file transfer capabilities.

Without these capabilities, the desirable volumes are just not there. Desirable volumes, to Davis, are in the range of 2,500 end users or more in an organization enacting 20 high-speed system transactions per day per user, often on electronic forms of each user's own ad hoc design.

"Full screen filing is the gut of true location independence," he explains. "Without this, you've really only got half an electronic desk to work from." With the full screen editing and file transfer capabilities, two activities are put in motion: one, the company automation project; the other, the individual's attempt to use the system to improve his daily job.

Data General Corp. believes in the paperless office. Two and a half years ago, DG expanded its telecommuting capabilities with the introduction of its Comprehensive Electronic Office (CEO) OA product. What had started as a tool for engineering and software personnel was discovered by finance, manufacturing and administrative users.

Now, according to Lloyd Benson, manager of technical services for MIS, approximately "10% of some 3,000 to 4,000 personnel have terminals in their homes." Like IBM, DG

emphasizes after-hours work in its program.

DG realizes benefits from telecommuting similar to those mentioned earlier: assignments completed on time, more individual creativity, better use of system resources in off hours and improved quality of life.

The distinction between this program and earlier models of telecommuting, if there is one, is that DG's program is growing directly out of the impact of its CEO system and its interest in designing for the non-DP front-office worker. The built-in decision support tools extend the virtual desk wherever nontechnical professional employees need it.

#### Networks as a telework catalyst

Telecommunications network vendors play an important role in the future of telework, if only because

telecommunications costs are often seen as an obstacle to more rapid growth. Rather than viewing themselves as an obstacle, telephone companies such as Pacific Bell Telephone Co., Southern New England Telephone Co., Mountain Bell Telephone Co., General Telephone Co. of California and others are hoping to spur network use by cultivating telework applications.

Postdivestiture Pacific Bell set its sights on becoming a major catalyst for telework. So that it could speak to its customers from direct experience, the company started an ambitious series of programs in 1985.

Under director Lynda Anapol, a five-person team supervises implementation of a pilot program that saw 60 employees start part-time telecommuting at home before the end of its first year. Engineers, mar-

keting planners, project managers, external affairs managers, forecasters, programmers and analysts are involved. At least another 100 employees will start telecommuting this year.

In addition, satellite telework offices, which some observers see as possible alternatives to at-home telecommuting, are being tested in San Diego, Sacramento, Calif., San Francisco and Woodland Hills, Calif. The latter two sites involve employees with multiple disciplines, while the former two are single-discipline offices. The central idea of each is to relocate office space nearer to suburban housing to shorten employee commute times.

Satellite office teleworkers retain the advantages of physically centralized office resources. The idea's supporters envision regional benefits

## 'Smart' key to secure telework

Most telecommuter security systems incorporate some kind of callback system as a standard device. But for professional and executive telework, a limitation of this approach arises: In these high-mobility applications, callback telephone numbers are not practical.

One emerging solution to this type of situation that offers other security benefits as well is a "smart card" approach [CW, Dec. 23]. A domino-size token with a small LCD, which fits on the telecommuter's keychain, is the "key."

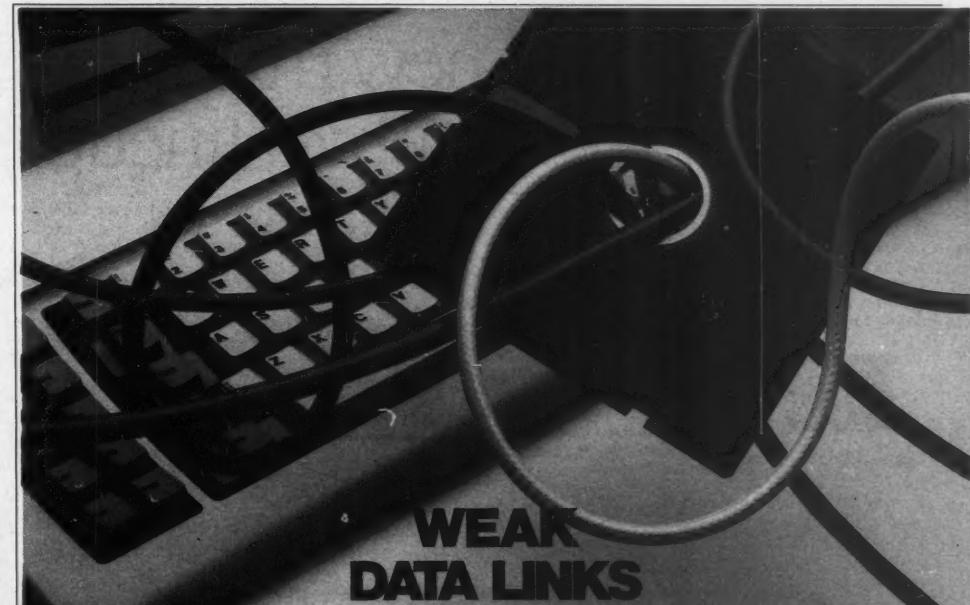
After an initial sign-on procedure, the key is held up to a set of flashing characters on any CRT.

The key reads the flashes, then generates a one-time password using its built-in circuitry. The telecommuter types in that password to gain full access to the system.

A half dozen companies are said to be near commercial development of some kind of similar smart card security device.

Projected costs for these devices are expected to be quite reasonable.

— Thomas Miller



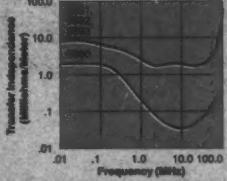
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## In Depth/High-Performance Telework

such as reduced commuter traffic congestion, transportation and energy cost savings and possible neighborhood revitalization.

In conjunction with its wider interests, Pacific Bell is intent upon making telecommuting operate well internally. Leslie Crawford, marketing manager for the telecommuting program team, cites goals such as solving employee retention, retraining and recruiting problems to combat the scarcity of highly skilled personnel. "Telecommuting is one more option to attract people to an organization," she says.

Pacific Bell figures it takes about \$110,000 to recruit and train a highly skilled systems analyst. After studying why a number of such employees left the company over a period of time, Pacific Bell concluded telecommuting might have enabled

"Enthusiasts see a grand vision of OA where telework emerges not in opposition to centralized work — as it is so often depicted and dismissed — but as a work style made possible by OA that can help with the continual struggle to optimize the use of decentralized organizational resources."

the company to retain about one-third — those who left because of relocation and transportation problems.

Team member Gary Timmons points out, "The payback is very attractive in cases like this, without even considering prospective productivity output gains and other kinds of benefits."

To help keep costs down at Pacific Bell, telework expenditures come out of established budgets — where trade-offs are sought — rather than out of an overall telecommuting budget.

Thus, whatever equipment a telecommuter uses in his office is actually moved to the employee's home. The equipment is considered job spe-

cific rather than telework specific.

"We avoided duplication of work station requirements," Anapol notes. "You don't go to your office to sit at your terminal. You go for face-to-face communication, group meetings and personal interaction that you miss in a remote working environment."

#### Telephone line services

The type of telephone line installed in a telecommuter's home depends upon specific use. Among other things, Pacific Bell uses its own public packet-switched service for asynchronous data transmissions; the service is still not available to the public.

Voice mail and 800 numbers are used for some voice communications needs, and telephone bills, including installation fees, go directly to the company rather than to individuals.

Other telecommunications vendors now offer specific network services to attract data communications business from outside telecommuters. For example, GTE Telenet Communications Corp.'s PC Pursuit, available in some 12 U.S. cities, and Southern New England Telephone Co.'s ConnNet, available only within the state of Connecticut, are two packet-switching services designed for flat-rate discount pricing. This setup keeps users from getting that nasty feeling that comes from sitting on-line and realizing the meter is running.

#### The 'virtual desk'

The electronic networking of work and people in today's large organizations is well under way. Progress in critical standardization issues, improved computing cost/performance ratios, exponential growth of communications bandwidth and embedding of Integrated Services Digital Network capabilities in the public network all point to a huge expansion in the kinds of jobs that will be practical to perform outside the office of the future.

Enthusiasts like National Business Systems' Davis see a grand vision of OA where telework emerges not in opposition to centralized work — as it is so often depicted and dismissed — but as a work style made possible by OA that can help with the continual struggle to optimize the use of decentralized organizational resources.

Managers gain better performance and control through telework because the work appears virtually wherever and whenever the worker is best prepared to do the job. In this vision, quality of life also becomes a truer option because the work is able to bend more to the real needs of the person — with benefits to the organization as well as the individual.

Despite this promise, the growth curve to a wider world of telework remains flatter than the visionaries would like. Consciousness of the new communications dynamics of high-performance telework comes in fits and starts. In this context, optimists in the field like to remind people that the telephone — the first and foremost telework tool — was once considered a departmental business tool, with one instrument allotted per department.

DP and MIS managers should take notice when they hear users talk about doing more work from home. Telework is not the wave of the future. It is here now.

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# NEW PRODUCTS

## Accunet goes international

AT&T extends packet service to five foreign countries

AT&T has inaugurated an international version of Accunet Packet Service over its public network, initially serving the UK, France, Italy, Japan and Canada.

Accunet Packet Service uses public transmission network circuits at different speeds and configurations as an alternative to leased international private lines. In last week's announcement, AT&T said the International Accunet service will link its U.S. Accunet lines with the packet-switched networks of the five foreign countries to be served. The transmission speed per packet will reportedly be 9.6K bit/sec.

AT&T said its charges for the international packet service will be separate from domestic U.S. rates and will vary from country to country. In Canada, for example, rates are expected to range from \$2.25

to \$3.25 per kilopacket, depending on type of connection, and users will pay from \$1.80 to \$3.25 per hour of use.

Service to the UK, France, Italy and Japan will be billed at a rate of \$10 for each kilosegment transmitted and \$8 per hour of use.

Among existing AT&T International Accunet services are Reserved 1.5 for reservation-based data and video teleconferencing; Dataphone Digital Service, a private-line link at speeds of 2.4K, 4.8K, 9.6K and 56K bit/sec.; and Skynet International service, a dedicated satellite offering.

Other carriers offering similar public packet-switching services internationally are GTE Telenet Communications Corp. and MCI International, a subsidiary of MCI Communications Corp.

## Productivity tool for nets introduced

Network Innovations Corp. of Cupertino, Calif., has announced Multiplex, a network productivity tool that links personal computers to data bases on multiuser systems.

According to the vendor, Multiplex employs a full relational query facility to allow personal computer user to browse the contents of the data base, to locate data of interest and to extract it across a network into a personal computer file.

Multiplex is said to format the data automatically for processing by personal computer software packages such as Lotus Development Corp.'s 1-2-3, Ashton-Tate's Dbase and Micropro International Corp.'s Wordstar. The five file formats that are supported are Worksheet, Dbase, Text, Symbolic Link and Data Interchange.

Multiplex uses IBM's SQL for access to host data bases. Multiplex is said to eliminate the need for a personal computer user to understand Unix commands or data base query languages. According to a company spokesman, Multiplex provides a screen-oriented interface, similar to Lotus' 1-2-3, that simplifies data base inquiry and is independent of the particular host system or data base brand being used.

Four Unix data base management systems are currently supported. They are Informix/SQL from Relational Database Systems, Inc. of Menlo Park, Calif.; Ingres from Relational Technology, Inc. of Alameda, Calif.; Oracle from Oracle Corp. of Menlo Park, Calif.; and Unify from Unify Corp. of Sacramento, Calif.

In addition to the data base link, Multiplex provides network file management services for personal computer and Unix system files. It also offers Digital Equipment Corp. VT100 terminal emulation.

Multiplex is licensed on a per-host basis, with list prices starting at \$695 for a three-user IBM Personal Computer AT system. The price for a mid-range Motorola, Inc. M6800-based system is \$1,195, and for a DEC VAX 11/780-class system the price is \$6,000.

## APL Plus PC version out

STSC, Inc. of Rockville, Md. has released a runtime version for Release 5 of its APL Plus PC System.

The APL Plus PC System is an application development system. The runtime version is available for applications developers who produce APL-based software for distribution or sale. It allows developers to take advantage of all the features of the APL Plus PC System without requiring their end users to purchase the complete system.

The runtime version is an adaptation of the APL Plus PC System modified to run a single application. The modified interpreter enables developers to include enough of the APL Plus PC System to run their applications but not enough to allow end users to write or modify their own APL programs.

Installation instructions and utilities are supplied with the runtime software. It is licensed on a royalty basis or for a per-copy per-system fee of \$100.

## Gateways to unite IBM's VM, MVS with DEC's Decnet

Interlink Computer Sciences, Inc. of Fremont, Calif., has announced its 3711S Gateways, designed for IBM and Digital Equipment Corp. communications.

The two gateways are said to integrate IBM's VM and MVS operating systems with DEC's Decnet.

The products offer bidirectional file transfer and data access, data translation of all data types, an RJE interface, task-to-task communications and bidirectional terminal emulation.

A company spokesman stated that the gateways do not require any special programming and that they can be upgraded to the vendor's high-end products, the VM/Decnet Gateway and the MVS/Decnet Gateway.

Prices for the 3711S Gateways start at \$40,000 for single-direction access. The price includes hardware, software, installation and warranty.

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### INSIDE

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- Systems & Peripherals/92
- Price Reductions/95

## NEW PRODUCTS/SOFTWARE &amp; SERVICES

## SOFTWARE &amp; SERVICES

## Systems software

Advanced Systems Concepts, Inc. has announced VaxJournal, External Performance Simulation Systems (EPSS) and Version 2 of its Performance Simulation Systems (PSS) for Digital Equipment Corp. VAX systems.

VaxJournal is a general-purpose restart/recovery facility for DEC's Record Management Systems files. EPSS is used to test the performance of external VAX systems, and PSS allows a user

to record one or more terminal sessions.

VaxJournal ranges in price from \$7,500 to \$20,000. EPSS costs range from \$3,500 to \$5,000, and PSS costs range from \$2,000 to \$10,000.

Advanced Systems Concepts, 22 Hudson Place, Hoboken, N.J. 07030.

Calview Management, Inc. has enhanced its VM/DMR integrated software system said to provide analysis and information to manage DASD space in a VM environment.

The enhancements include an Adate option that allows

only files entered before a named date to be analyzed, an Adays option that allows the user to specify an analysis period in days and a Volser option that allows for reporting against specific DASD volumes.

The system costs \$4,000 for a permanent site license.

Calview Management, Suite 378, 560 S. Hartz Ave., Danville, Calif. 94526.

Network Research Corp. has ported its Fusion software to Digital Equipment Corp.'s Microvax II.

Fusion on the Microvax II supports both TCP/IP and XNS protocols allowing Microvax users to connect to Unix, VMS and Microsoft Corp. MS-DOS machines as well as any others supporting TCP/IP or XNS.

It will run simultaneously with Decnet network software. It is also available supporting DEC's Deqna board.

Fusion costs \$3,600.

Network Research, 2380 N. Rose Ave., Oxnard, Calif. 93030.

IBM has released MVS/XA DFP Version 2 Release 2, which is said to include support for IBM 3380 Extended Capability Models.

Version 2 Release 2 also provides virtual storage constraint relief and additional device support for the MVS/XA user. Features include erase-on-scratch security, a console command, support for the extended recovery facility, an access method services command and IBM 3480 block-count checking.

There is no initial license charge for MVS/XA DFP Version 2 Release 2. The basic monthly charge is \$900.

IBM, 1133 Westchester Ave., White Plains, N.Y. 10604.

Uniplex Integration Systems, Inc. has announced Uniplex-II Plus, an office automation product for Unix-based computer systems.

Uniplex-II Plus is said to offer word processing, spreadsheet and data base applications as well as integration at the source code level. Features include a macro programming language, business graphics, screen builder, calendar management and a report writer.

The program is said to be compatible with Relational Database Systems, Inc.'s Informix-SQL and Hooks open architecture program.

Uniplex-II Plus is priced from \$895 on the IBM Personal Computer AT.

Uniplex Integration Systems, Suite 1300, 9400 N. Central Expwy., Dallas, Texas 75231.

## Applications packages

RMS Systems has ported its Trimax PM computer-aided manufacturing system to

the IBM System/36 PC.

The basic version of Trimax features an on-line equipment history, work

Continued on page 76

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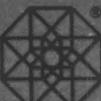
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## NEW PRODUCTS/SOFTWARE &amp; SERVICES

Spaceman is said to adjust dynamically DASD usage as Adabas files grow and file usage patterns change, plus allocate DASD costs to applications based on use of space within the data base. It monitors I/O-to-disk performance by reporting where I/O occurs and by identifying file tuning parameters that can reduce the amount of I/O to Associator, Data and Work data sets.

Spaceman runs on the IBM 4300 or compatibles and costs \$9,750.

Database Utility Group, P.O. Box 4912, Federal Way, Wash. 98063.

## Training software

**Computer Systems Research, Inc.** has introduced the **CSR 3090 System Operation and Problem Resolution** computer-aided instruction training package for teaching computer oper-

ators and system programmers the fundamentals and operation of IBM's Model 3090 mainframe.

The package simulates an actual 3090 environment. The course is self-paced and trains students on general use of 3090 hardware and software.

The package costs \$7,200.

Computer Systems Research, P.O. Box 45, Avon Park S., Avon, Conn. 06001.

**Innovative Software Solutions, Inc.** has added the **Getting Started with Dictionary/3000** module to its Teachme/3000 series of computer-based training modules for the Hewlett-Packard Co. HP 3000.

The module is said to provide information about using HP's Dictionary/3000 and the utilities that are

part of the Dictionary/3000 package. The module comes with a 55-page workbook.

The module costs \$1,000. The module and the Teachme driver program combined cost \$2,000.

**Innovative Software Solutions, 10705 Colton St., Fairfax, Va. 22032.**

## Services

**Fidelity Brokerage Services** has introduced **Vestor**, an on-line investment advisor.

Vestor offers financial news retrieval and evaluation. It evaluates securities, offers buy and sell advice and offers a library of financial information going back 20 years. Vestor users also have access to other Fidelity programs such as Investor's Express, order entry, account and portfolio management.

Users pay a sign-on charge of \$195 and a monthly service fee of \$24.

**Fidelity Brokerage Services, 82 Devonshire, Boston, Mass. 02110.**

**DGC, Inc.** has announced a text titled **"Insights into the IBM System/38."**

The text is intended for DP personnel who own or are considering the acquisition of an IBM System/38, the vendor said. It provides technical education and performance tips.

The cost of the text is \$95.

**DGC, 1450 Preston Forest Sq., Dallas, Texas 75230.**

**Fox Research, Inc.** has announced its **Fox 10-Net Training Program** for Fox dealers and customers using the 10-Net local-area networking system.

The program is designed in modular format. It includes a training manual and four audio cassettes accompanied by slides. The four sections deal with hardware installation, software installation, 10-Net security and 10-Net utilities.

The program costs \$80. Additional manuals are available for \$25.

**Fox Research, 7005 Corporate Way, Dayton, Ohio 45459.**

**Associated Technology Corp.** has introduced a four-volume **programming documentation guide** for Cobol, Fortran, Basic and Dbase languages.

The set was designed to serve as a software management tool for establishing a firm's internal programming and documentation practices. It provides methodology consisting of guides and examples. The methodology is said to ensure users group acceptance as well as well-structured, testable and easily maintainable software. The set costs \$47.50.

**Associated Technology Books, Box 475, Rt. 2, Estill Springs, Tenn. 37330.**

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## NEW PRODUCTS/SOFTWARE &amp; SERVICES

**Advanced Systems, Inc.** has introduced **System/38: An Introduction for Users and System/38: Work Station Operator Training for IBM 5291/5251**, two training courses for IBM System/38 users.

The introduction is an overview of System/38 functions and capabilities. It is an eight- to 10-hour-long, four-part, learner-paced videotape program. The workstation operator training is in three videotape sessions and provides hands-on practice on a separate diskette.

Both courses include a coordinator's guide and a student guide. They may be rented starting at \$50 per module per month.

Advanced Systems, 155 E. Algonquin Road, Arlington Heights, Ill. 60005.

## MICROS

## Systems

**Data Translation, Inc.** has introduced the **DT2851 High-Resolution Frame Grabber**, an image processor said to achieve minicomputer throughput speeds on an IBM Personal Computer AT; the **DT2858 Auxiliary Frame Processor**; and the **DT-Iris Image Processing Software**.

The DT2851 digitizes, stores, processes in real time and displays video images. The DT2858 maximizes system performance. The software provides application and subroutine support for real-time digital image processing.

The DT2851 costs \$2,995, the DT2858 costs \$1,495, and the software costs \$995.

Data Translation, 100 Locke Drive, Marlboro, Mass. 01752.

As project requirements and work load demands increase drawing output and the number of design and drafting personnel, Boardbuster can grow to meet the demands.

Boardbuster requires an IBM Personal Computer XT or Personal Computer AT, Hewlett-Packard Co.'s Vectra or Compaq Computer, Inc.'s D286. The product requires 640K bytes of memory.

Boardbuster sells for \$2,000.

Holguin, P.O. Box 12990, 5822 Cromo Drive, El Paso, Texas 79912.

**Z-Soft Corp.** has announced the **PC Presentation** graphics software program.

PC Presentation is a slide show program said to give the user the ability to create presentations.

According to a vendor representative, it features the

ability to create special effects such as animating objects, changing their colors, varying color intensity, pushing out old scenes and painting new ones with splits, rolls, fades, crashes and spirals.

Images can explode or be randomly painted on the screen.

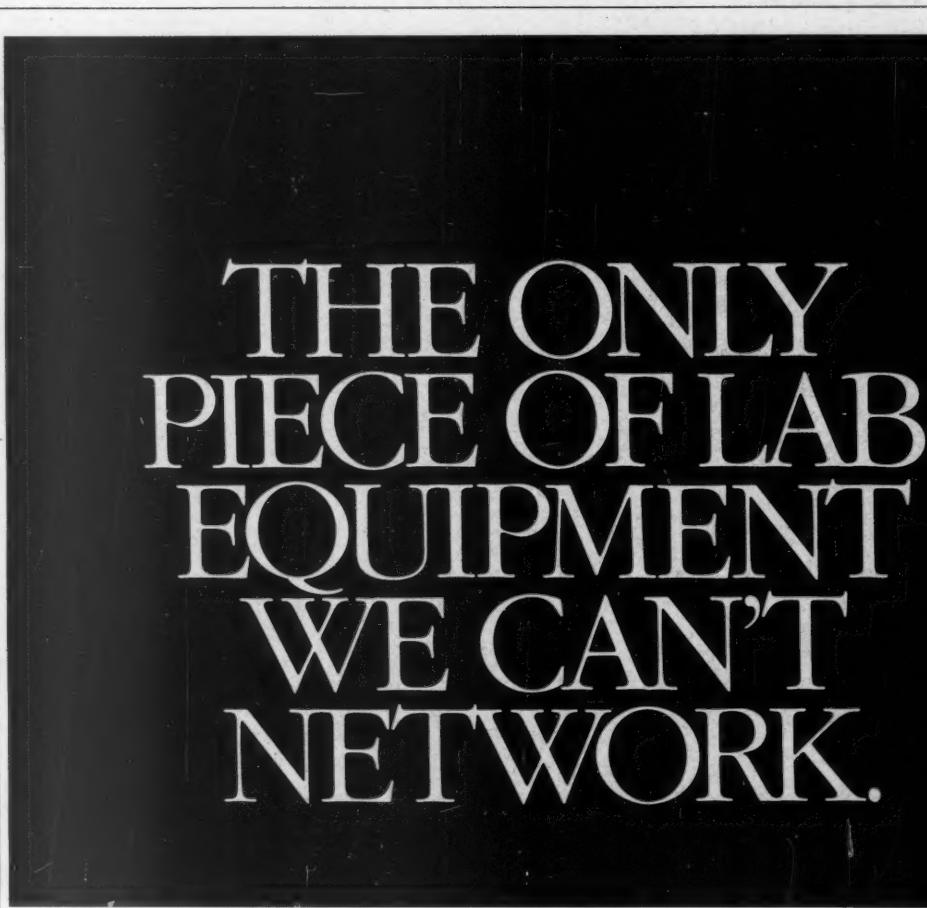
PC Presentation sells for \$95.

Z-Soft, Suite A-495, 1950 Spectrum Circle, Marietta, Ga. 30067.

**Arrays, Inc.** has announced the **Window Ware** series of business software for IBM Personal Computers, including **Windowword, File Buster** and **Report Grabber**.

Windowword is a word processor that allows users to work with up to four documents at a time. It features user-definable document formatting, multiple formats within documents, mail merge and document assembly.

File Buster is a file trans-



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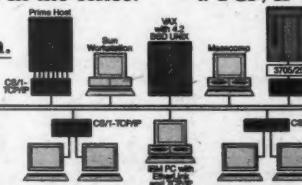
4.2 users, and CAE/CAD folks have been wild about

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Our GS/3-IP is the first high-performance gateway capable of linking up multiple TCP/IP-based remote Ethernets.



## Software applications packages

**Holguin Corp.** has announced **Boardbuster**, a computer-aided design (CAD) drafting software package for personal computers.

The package is said to provide the advantages of CAD, drafting and analysis for any size firm's configurations, ranging from a single workstation to a multiuser network.

## NEW PRODUCTS/MICROCOMPUTERS

fer utility said to offer accounting integration functions. Report Grabber is a random-access-memory-resident, pop-up file capture and transfer utility.

Windowword costs \$149. File Buster and Report Grabber cost \$74.95 each.

Arrays, 6711 Valjean Ave., Van Nuys, Calif. 91406.

Integral Systems, Inc. has introduced HR-Spectrum, a

package said to allow human resource professionals to download data from Integral Systems software to personal computers for planning and analysis.

HR-Spectrum extracts data from the mainframe payroll/personnel data base and transmits it in on-line or batch mode to a user's stand-alone personal computer.

HR-Spectrum runs on IBM Personal Computers in conjunction with IBM mainframes. It costs \$45,000.

Integral Systems, 165 Lennon Lane, Walnut Creek, Calif. 94598.

Eyring Research Institute, Inc. has introduced Stat68, a statistical package for use with the PDOS operating system on Motorola, Inc. 68000-based systems.

Stat68 is a menu-driven regression analysis package. It is said to tie together quality assurance and process

monitoring. Features include options that allow the user to edit data and use simple statistics. Stat68 can also be used to plot information in histograms, scatter plots, box plots and residual and partial residual plots.

Statistical functions available include simple linear regression, polynomial regression and multiple regression.

Stat68 costs \$750.

Eyring Research Institute, 1450 W. 820 North, Provo, Utah 84601.

Usercom Systems, Inc. has introduced U-Forecast, a statistical forecasting software package that runs on the IBM Personal Computer or Personal Computer XT.

U-Forecast is a menu-driven data base-oriented system. It offers a choice of exponential, least square and moving average forecasting methods, to analyze actual, budgeted and forecasted data and estimates. Projections can be generated by customer, product, district, territory or region.

U-Forecast costs \$145.

Usercom Systems, 2200 E. Devon Ave., Des Plaines, Ill. 60018.

Spectrum Holobyte, Inc. has announced Version 3 of The Executive Picture Show, its business graphics program.

Version 3 reportedly offers 128 color permutations from the graphics color palette and creates an unlimited number of font styles.

Users can import graphics and text screens from other programs such as Lotus Development Corp. 1-2-3, Ashton-Tate's Dbase III and Micropro International Corp.'s Wordstar. They can also output to plotters and dot matrix printers, the vendor claimed.

Designed for the IBM Personal Computer, The Executive Picture Show Version 3 retails for \$245.

Spectrum Holobyte, Suite 325, 1050 Walnut, Boulder, Colo. 80302.

Datapak Software, Inc. has unveiled Executive Office, an integrated office management system for the 512K-byte Apple Computer, Inc. Macintosh.

The package integrates file management, word processing, graphics, electronic work sheet, alphanumeric math table functions, mail merge and the ability to generate mailing lists.

Executive Office also integrates with other Macintosh software such as Macpaint, Macwrite and Excel, according to a spokesman.

The software sells for \$349.99.

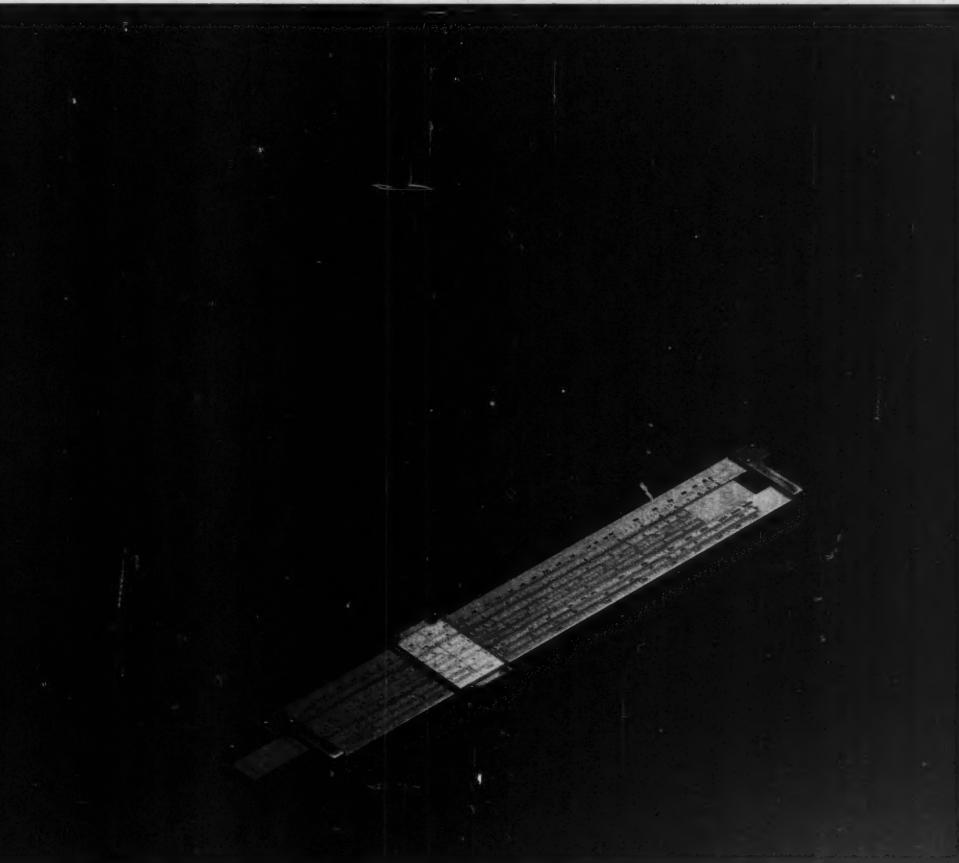
Datapak Software, Suite 402, 14011 Ventura Blvd., Sherman Oaks, Calif. 91423.

## Software languages

Greenleaf Software, Inc. has released The Greenleaf Comm Library Version 2, a programmer's tool supporting the C language.

The library is said to provide interrupt-driven, ring-buffered asynchronous communications for the IBM Personal Computer. It offers more than 120 functions supporting communications up

Continued on page 80



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## NEW PRODUCTS/MICROCOMPUTERS

**Continued from page 79**

to 9.6K bit/sec., up to 16 simultaneous channels, Xon/Xoff and Xmodem protocols and numerous flow control options.

The Greenleaf Comm Library is priced at \$185.

Greenleaf Software, Suite 101, 1411 LeMay Drive, Carrollton, Texas 75007.

#### Software utilities

**McDonnell Douglas Computer Systems Co.** has introduced PClink and PCmicroreality, software packages said to link its Reality operating system-based minicomputers and IBM Personal Computers.

PClink allows IBM Personal Computers to access any Reality-based host system, run in terminal emulation mode under Microsoft Corp. MS-

DOS and have direct access to the minicomputer's data and programs.

PCmicroreality is a micro version of the Reality operating system. It provides the same data base management operating environment as on the host, allowing a Personal Computer to access the minicomputer's data base and run its applications.

PClink is free. PCmicroreality costs \$995.

McDonnell Douglas, 17481 Red Hill Ave., Irvine, Calif. 92714.

(GDS) products.

PC Access allows the Personal Computer to function as a workstation. It supports all the screen functions provided by the Tektronix, Inc. 4107 workstation.

The Autocad/GDS Translator converts Autodesk, Inc. Autocad drawings into GDS format. AEC/Link PC provides the link for communicating Personal Computer-based Autocad drawings to the Autocad/GDS Translator that resides on the GDS host computer. It can be used independently to transfer files between the personal computer and the host, the vendor said.

PC Access is priced from \$1,000. Autocad/GDS Translator, including AEC/Link PC costs \$5,000. AEC/Link PC costs \$500.

McDonnell Douglas, P.O. Box 516 St. Louis, Mo. 63166.

**DK Softworks** has announced **DK Showfile** and **DK Direct**, memory-resident utilities for the IBM Personal Computer.

DK Showfile provides a means for looking at any IBM PC-DOS or Microsoft Corp. MS-DOS text files in any subdirectory on any disk instantly.

DK Direct permits DOS subdirectory access when most programs without built-in DOS path support are used.

DK Showfile costs \$29.95. DK Direct costs \$24.95.

DK Softworks, Box 201182, Austin, Texas 78720.

**Best Power Technology, Inc.** has introduced **Datasave**, a software product designed to provide two-way communications between an IBM Personal Computer, Personal Computer XT, AT or compatible and its **Micro-Ferrups** uninterruptible power supply.

Datasave allows users to display line power status information from the Micro-Ferrups on the personal computer monitor. When a power failure occurs, a window will automatically display the estimated back-up time remaining, and Datasave will save all files and instruct Micro-Ferrups to turn off.

Datasave costs \$50. Best Power Technology, P.O. Box 280, Necedah, Wis. 54646.

**RCT Design, Inc.** has unveiled **Jobs**, utility software said to provide an interactive graphical user interface to IBM PC-DOS and Microsoft Corp. MS-DOS file and directory maintenance functions.

Jobs lets users view directory trees graphically or with files sorted by name, type, size or date. Directory functions include create, delete, rename and copy. Files can be copied, renamed, deleted or archived. A punch in/punch out job timer facility allows users to keep a record of computer time spent on different jobs.

Available for the IBM Personal Computer, Personal Computer XT and AT, Jobs sells for \$49.95.

RCT Design, P.O. Box 179, Nipomo, Calif. 93444.

#### Software data base management systems

**Raima Corp.** has announced **Version 2.1** of **DB Vista**, its data base management system for software development in the C programming language for use with Microsoft Corp. MS-DOS or Unix-like operating systems.

Version 2.1 features the ability to scan multiple keys at a time, a key file rebuild utility, a data base consistency check utility, a data field alignment check utility, file transfer utilities and an updated user's manual.

DB Vista multiuser version costs \$990 with source and \$495 without. The single-user version costs \$495 with source and \$195 without.

Raima, 12201 S.E. Tenth St., Bellevue, Wash. 98005.

**Unlimited Processing, Inc.** has unveiled **Team-Up**, a data base management system said to run in 256K of random-access memory and support

*Continued on page 82*



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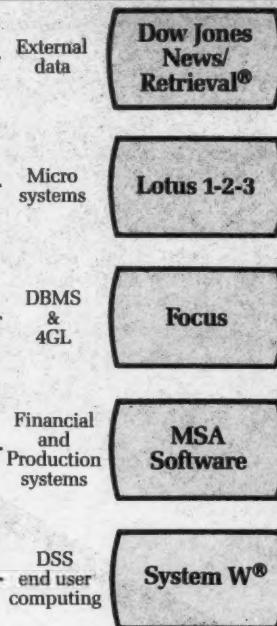
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## NEW PRODUCTS/MICROCOMPUTERS

**Continued from page 80**

port up to 255 files simultaneously, a maximum of four billion records per file and up to 1,000 fields per record.

Team-Up can also dynamically maintain up to 100 indexes and support a maximum of 1,900 characters per field and 8,187 characters per record.

The package runs on the IBM Personal Computer, Personal Computer XT, AT or compatible and requires a hard disk. Team-Up costs \$795. Multiuser versions cost \$1,795.

Unlimited Processing, Suite 8, 8382 Baymeadows Road, Jacksonville, Fla. 32216.

**Infosystems Technology, Inc.** has added Rubix Master to its Rubix relational data base management system.

Rubix Master is said to integrate the system's fourth-generation language, applications generator and other tools enabling users to execute functions such as defining data, tables and views; building data entry screens; and backing up and restoring data bases.

Rubix Master can reportedly be used to create data entry forms and custom menus. It can also interactively specify basic data base structure. In multiuser systems, users may concurrently read from and write to data bases.

Available for both Unix and IBM PC-DOS based systems, Rubix costs from \$595.

Infosystems Technology, 6301 Ivy Lane, Greenbelt, Md. 20770.

#### Software enhancements

**Financial Decision Systems, Inc.** has released Version 3 of Corptax Linx and Micro Corptax.

Corptax Linx is a tax-oriented trial balance system. Enhancements include a larger work area for custom reporting as well as programs said to increase execution speed.

Micro Corptax is an income tax preparation and planning system. Enhancements include acceptance of amounts up to -99,999,999,999, utilities to combine multiple data files and carry forward last year's balance sheet and programs said to increase execution speed.

Corptax Linx Version 3 costs \$2,000. Micro Corptax Version 3 starts at \$3,500.

Financial Decision Systems, 28035 Dorothy Drive, Agoura Hills, Calif. 91301.

**RG Software Systems, Inc.** has released PC Tracker Version 3 and PC Tracker Silver Edition for the IBM Personal Computer family.

PC Tracker is an inventory management system said to keep track of Personal Computers, software, peripherals and accessories from purchase order through installation and use. Features of Version 3 include rewritten documentation, expanded import/export facilities and new accounting reports, according to RG Software.

PC Tracker Silver Edition adds three modules to PC Tracker: problem history, depreciation and selective contact list.

PC Tracker costs \$495, and the PC Tracker Silver Edition costs \$695.

RG Software Systems, P.O. Box 426, Fort Washington, Pa. 19034.

**Wharton Econometric Forecasting Associates** has enhanced its Aremon/PC integrated software system for economic and financial analysts.

Aremon/PC 1.2 features full screen capabilities. It also includes communications features said to speed data transfer programs. Other features include an enhanced editor and file manager.

Aremon/PC 1.2 runs on IBM Personal Computers and compatibles. It costs \$3,000, plus a \$1,000 yearly training and maintenance fee.

Wharton Econometric Forecasting Associates, 3624 Science Center, Philadelphia, Pa. 19104.

ware products.

Enhancements in Photofile Version 3 and Photofile Professional Version 4 allow storing slide captions along with slide numbers in a file and print them, selecting between manual file numbering or automatic sequencing and exiting from the screen listing when selecting a category search in the Find function.

Prices are \$125 for Photofile Version 3 and \$199 for Photofile Professional Version 4.

Micro Software Solutions, P.O. Box 851504, Richardson, Texas 75085.

**Northwest Analytical, Inc.** has added cumulative sum charting methods to Version 2.1 of its statistical quality control charting package, NWA Quality Analyst.

This release also expanded its process capability section to include engineering tolerance analysis, direct computation of process capability indexes and output as both text and presentation graphics.

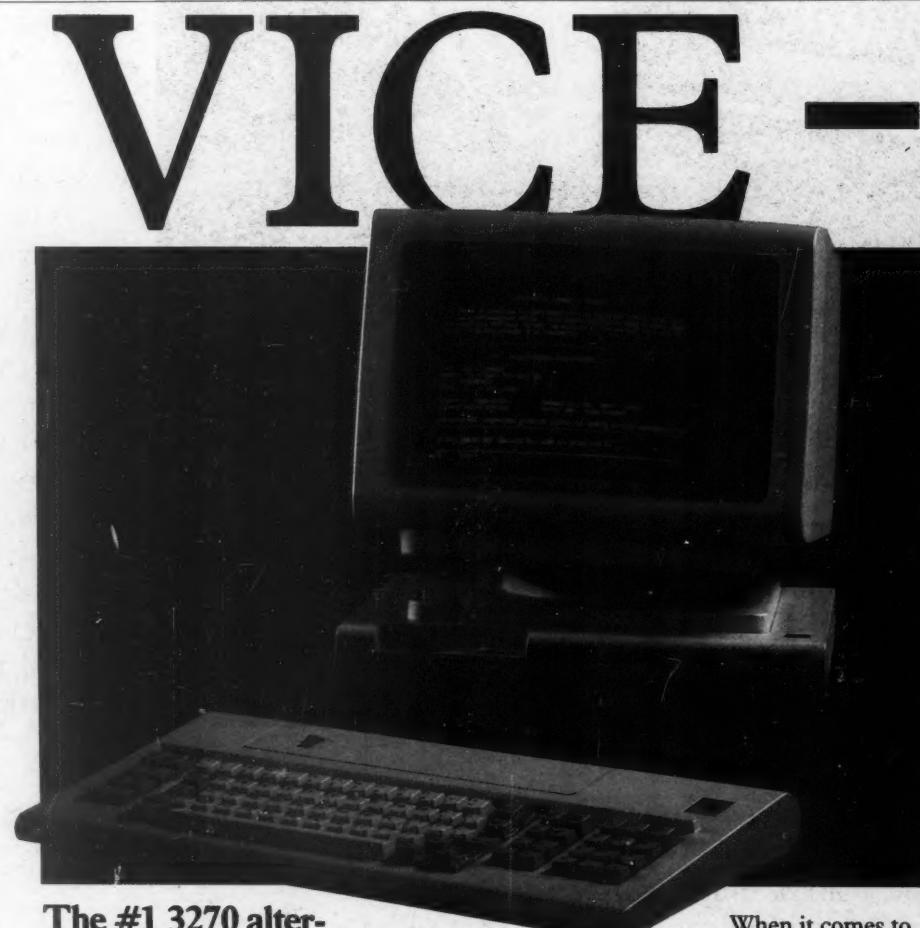
Available for IBM Personal Computers and compatible Microsoft Corp. MS-DOS computers, NWA Quality Analyst costs \$495 per copy.

Northwest Analytical, 520 N.W. Davis St., Portland, Ore. 97209.

#### Communications

**Gateway Microsystems, Inc.** has added the SyncLink 208 A/B PC modem to its SyncLink communications product line.

Designed for installation in an IBM Personal Computer, Personal Computer XT, AT or compatible, the unit is an AT&T-compatible, 4.8K bit/sec.,



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## NEW PRODUCTS/MICROCOMPUTERS

half-duplex synchronous modem with autodial and autoanswer capabilities. Other features include automatic pulse or tone dial selection, built-in diagnostics and support of byte-synchronous and bit-synchronous line protocols.

The modem costs \$1,495.

Gateway Microsystems, Suite 105, 9501 Capital of Texas Highway, Austin, Texas 78759.

**Rational Data Systems** has announced PC/VS and Popterm/200 for IBM Personal Computers.

PC/VS is a combination of hardware and software that links personal computers and Data General Corp. MV family minicomputers running the AOS/VS operating system. It allows users to store data and pro-

grams on the MV, and it supports file transfers and remote printing.

Popterm/200 is a memory-resident DG D200 terminal emulator. It can be used stand-alone or as an enhancement to PC/VS.

Prices for PC/VS range from \$7,000 to \$80,000. Popterm/200 costs \$150 for asynchronous systems and \$100 for Ethernet systems.

Rational Data Systems, Suite 410, 5725 Paradise Drive, Corte Madera, Calif. 94925.

**Standard Microsystems Corp.** has announced Advanced Netware/SM Version 1.02 and Advanced Netware/286/SM.

Advanced Netware Version 1.02 is a networking package designed to take advantage of the protected

mode environment capability of Intel Corp. 80286-based computers. It features a Netbios emulator said to allow software written for Netbios-compatible networks to run using the vendor's Arcnet-PC100 local-area network controller board.

Advanced Netware/286/SM also contains a Netbios emulator.

Advanced Netware/SM Version 1.02 costs \$1,595, and Advanced Netware/286/SM costs \$1,695.

Standard Microsystems, 35 Marcus Blvd., Hauppauge, N.Y. 11788.

neous transmission of data from a single send station to multiple receive stations without operator intervention. It uses Hayes Microcomputer Products, Inc. modems and the AT&T Alliance voice-grade bridge. It provides error checking and correcting.

Baudcaster reportedly improves on Downloader by permitting the simultaneous execution of the same program at many sites.

Downloader costs \$400 per site, and Baudcaster costs \$700 per site.

K-Talk, 3920 Olentangy River Road, Columbus, Ohio 43214.

**Microtechnology Sources, Ltd.** has announced the **Multiuser/Local-Area Network Module** for its Fourth Shift Manufacturing Software series for IBM Personal Computers.

The module allows Fourth Shift workstations to be connected and interfaced through a network server, cables and local-area network interface boards. This connection permits

*Continued on page 84*

# PRODAS

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Database Programming Language with Multikeyed Databases, Full Screen Data Entry, and Random Database Access. The most complete database programming system on the market. The SAS data step is merely a subset of the PRODAS programming language.

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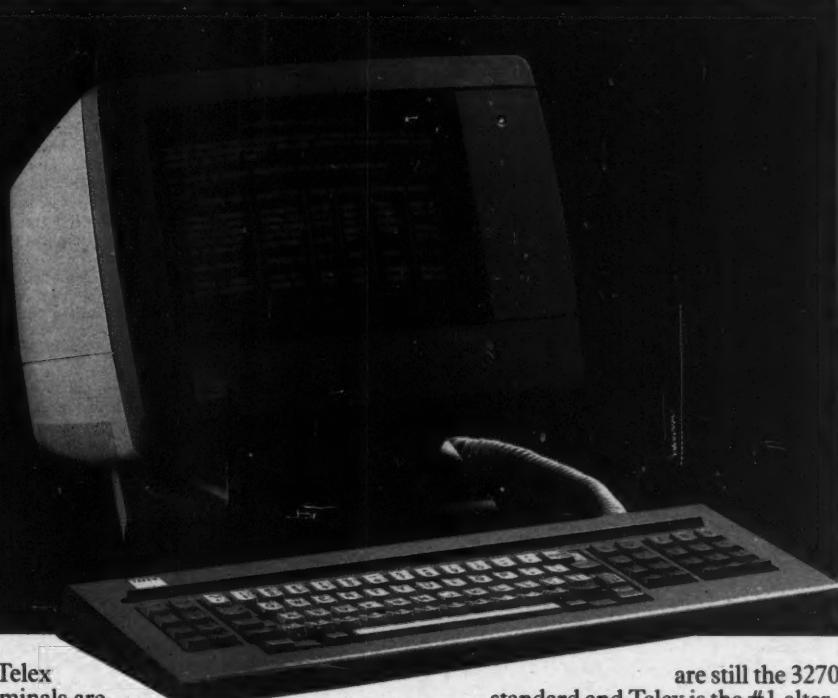
PRODAS is the Professional Database Analysis System for the IBM/PC XT and AT.

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PRODAS, Lotus, dBase, SAS and trademarks of Conceptual Software, Lotus, Ashton-Tate, and SAS Institute, respectively.

# VERSA



Telex terminals are more than compatible. More than interchangeable. They add value and flexibility to your 3270 network. So while IBM terminals

are still the 3270 standard and Telex is the #1 alternative . . . maybe it should be vice-versa. For more information contact John Hawkins, 6422 E. 41st Street, Tulsa, OK 74135/1-800-331-2623.

The #1  
3270 Alternative  
**TELEX**  
TELEX COMPUTER PRODUCTS, INC.

## NEW PRODUCTS/MICROCOMPUTERS

**Continued from page B3**  
any authorized user to access the Fourth Shift network from any workstation and to communicate and share information and resources between workstations.

The module is priced at \$2,495.

**Microtechnology Sources**, 3400 Conserv Drive, Eagan, Minn. 55122.

Dias Corp. has announced

**PCLink/1000 Version 2**, a software program said to provide file transfer capability from a personal computer to a Hewlett-Packard Co. HP 1000 for the Walker, Richer and Quinn, Inc. Reflection HP terminal emulator software.

Version 2 offers support for Holquin & Associates, Inc.'s computer-aided design and drafting system for transfers to Autodesk, Inc.'s AutoCAD, for remote computer systems, backup of hard disk drives, system modem

panels and older HP 1000 systems.

**PCLink/1000 Version 2** costs \$1,995 per CPU.

Site licenses for the product cost \$4,995 for multiple CPUs of the same series, and an unlimited site license costs \$5,995.

**Dias**, 363 Cretin Ave. S. St. Paul, Minn. 55105.

## Data storage

**Microcomputer Memories, Inc.** has announced

**Transpac-10 and Transpac-20**, portable 3 1/4-in. 10M-byte and 20M-byte disk drive and controller subsystems.

The subsystems provide the capability of transporting computer programs and data files between IBM Personal Computer systems and compatibles by moving only the Winchester memory. Transpac can be unplugged and reattached to any IBM Personal Computer or compatible.

**Transpac-10** costs \$1,095,

and **Transpac-20** costs \$1,295.

**Microcomputer Memories**, 9340 Owensmouth Ave., Chatsworth, Calif. 91311.

**Sigma Information Systems** has announced the **SDC-RQD11-B** Winchester controller designed to utilize an ST506 interface to communicate with a computer via Digital Equipment Corp.'s Mass Storage Control Protocol.

Two ST506-compatible 5 1/4-in. Winchester disk drives of any capacity may be connected to each SDC-RQD11-B, and up to three controllers may coexist in one system.

The controller is hardware compatible with DEC's LSI-11 series, Microvax I and II CPUs and Motorola, Inc. 68000 designs.

Features include 22-bit addressing and block-mode direct memory access transfers.

The controller costs \$1,295.

**Sigma**, 3401 E. La Palma Ave., Anaheim, Calif. 92806.

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**A NYNEX Company**  
The DATA Group Corporation, 80 Hayden Avenue, Lexington, Massachusetts 02173.  
1-800-247-1300. In Mass call 617-863-0400.

**McGraw-Hill Software** has introduced **Maxit**, a memory card for the IBM Personal Computer, Personal Computer XT, AT or compatibles.

Maxit is said to extend personal computer memory up to 256K bytes.

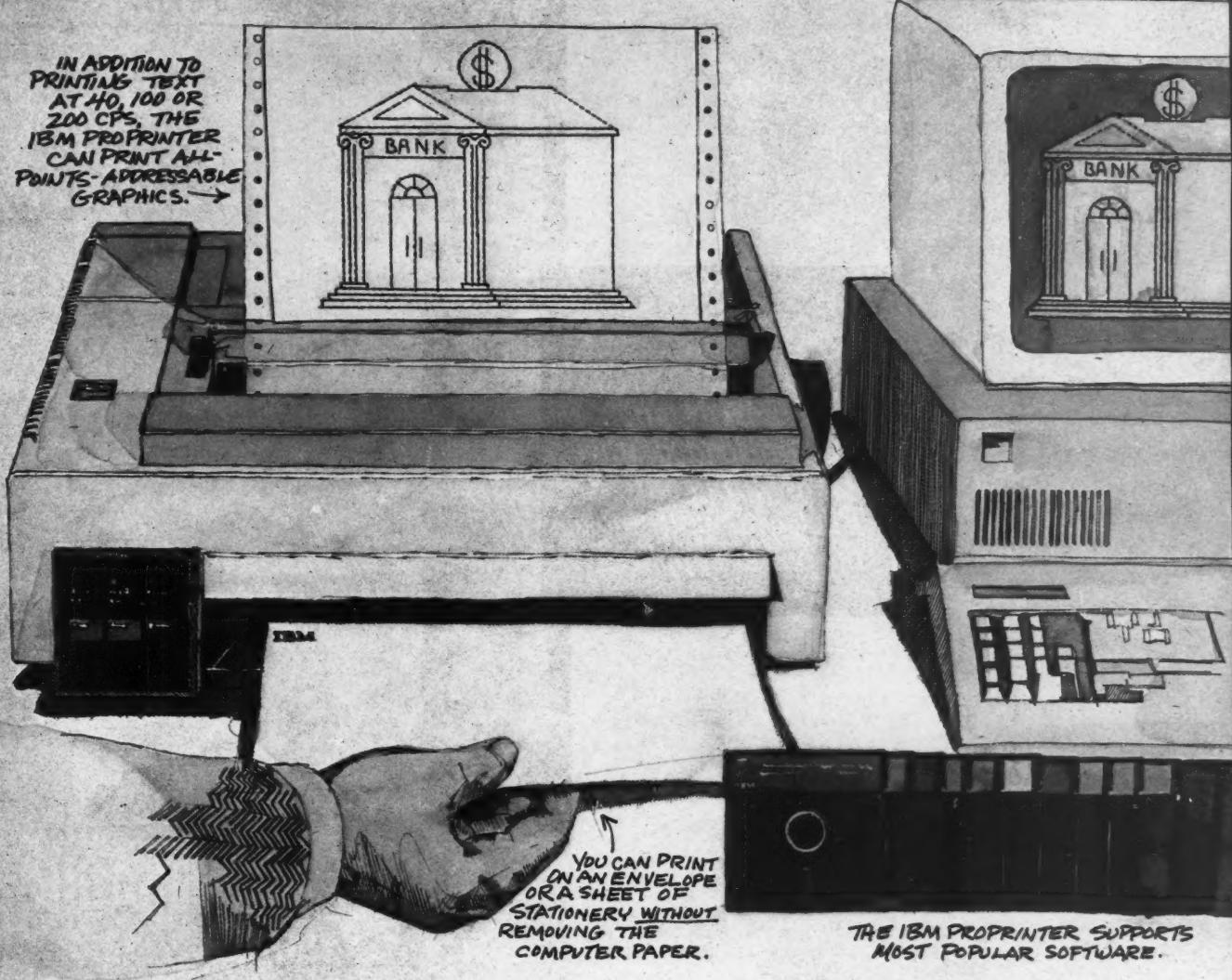
The memory card comes with software and an illustrated owner's manual, McGraw-Hill Software said.

Maxit requires Microsoft Corp. MS-DOS or IBM PC-DOS 2 or higher.

The card is priced at \$195, according to the vendor.

**McGraw-Hill Software**, Suite 1350, 8111 LBJ Freeway, Dallas, Texas 75251.

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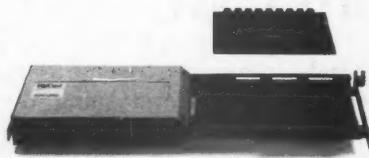
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2445 McCabe Way, Irvine, CA 92714. For information: (714) 863-7767.  
FileCard is a trademark of Western Digital Corporation.

## NEW PRODUCTS/MICROCOMPUTERS

The Teammate division of Data Technology Corp. has introduced a line of Winchester storage and tape backup subsystems for IBM Personal Computers.

The subsystems are offered as 20M- or 32M-byte Winchesters combined with 25M-byte cassettes or 60M-byte streaming tape cartridges, the vendor said.

Each unit features a single-slot controller.

Other features include automatic bad disk sector remapping, image and file backup verification, multivedice image backup, multiple-tape volume capability and batch and menu-driven operation, according to the vendor.

Prices range from \$2,095 to \$3,195.

Teammate, 2775 Northwestern Pkwy., Santa Clara, Calif. 95051.

## Printers/plotters/periipherals

Toshiba America, Inc. has introduced P321, a narrow-carriage printer for personal computer users.

Standard features include 24-pin print head, plug-in font cartridge capability, 216 char./sec. in 12-pitch draft mode, 180 char./sec. in 10-pitch draft mode, 72 char./sec. in 12-pitch letter-quality mode and 60 char./sec. in 10-pitch letter-quality mode, the vendor said.

A single-sheet paper guide is said to be standard.

The P321 costs \$699, according to Toshiba.

The product is upgradable through a variety of options, including a downloadable type font kit for \$99, an IBM Graphics Printer emulation kit for \$49 and an unidirectional tractor feed for \$99.

Toshiba America, 2441 Michelle Drive, Tustin, Calif. 92680.

The EVM 2319 23-in. monitor for Apple Computer, Inc.'s Macintosh has been introduced by Electrohome, Ltd.

The monitor can be added to a Macintosh via an Electrohome IM 56 interface module, according to a spokesman.

The product is said to be adjustable in horizontal frequencies from 15 KHz to 25 KHz via a rear-mounted control.

A variable scan feature reportedly allows users to display several signals of different frequencies on one monitor.

Users can switch from video to data during a presentation, according

to Electrohome.

The EVM 2319 is priced at approximately \$1,200.

The IM 56 module costs \$155, the vendor said.

Electrohome, 809 Wellington St. N., Kitchener, Ont., Canada N2G 4JG.

## Board-level devices

CSS Laboratories, Inc. has introduced the XT-286, a motherboard said to upgrade an IBM Personal Computer XT to the power of a Personal Computer AT.

The board incorporates a 16-bit Intel Corp. 80286 microprocessor, 512K bytes of memory that can be increased to 4M bytes and a clock with switch-selectable speed up to 8 MHz, the vendor said.

Additional features include 64K bytes of read-only memory, seven-channel direct memory access and real-time clock.

The product supports both the Personal Computer keyboard and the AT keyboard.

The XT-286 is priced at \$995, CSS said.

CSS Laboratories, 2134 S. Ritchey St., Santa Ana, Calif. 92705.

Hexace Technologies, Inc. has introduced the Monochrome Graphics card designed to expand the IBM Personal Computer, Personal Computer XT and compatibles.

The Monochrome Graphics card provides a monochrome character set, an RS-232C serial port and parallel port, both a text mode and a graphics mode and 100% compatibility with the IBM Monochrome card, the vendor said.

The Monochrome Graphics card is priced at \$289, according to Hexace Technologies.

Hexace Technologies, 271 North Mathilda, Sunnyvale, Calif. 94086.

BNW, Inc. has released software drivers for Personal CAD Systems, Inc.'s PCAD electrical computer-aided design system.

The controllers couple the PCAD design systems with BNW's Precision Graphic Adapter (PGA) Models 15 and 12 color controllers, permitting the user to have color graphics with resolutions up to 1,024 by 1,024 pixels. The BNW PGA Models 15 and 12 are single boards designed to occupy one slot in the personal computer.

Model 15 costs \$2,295, and Model 12 costs \$2,595.

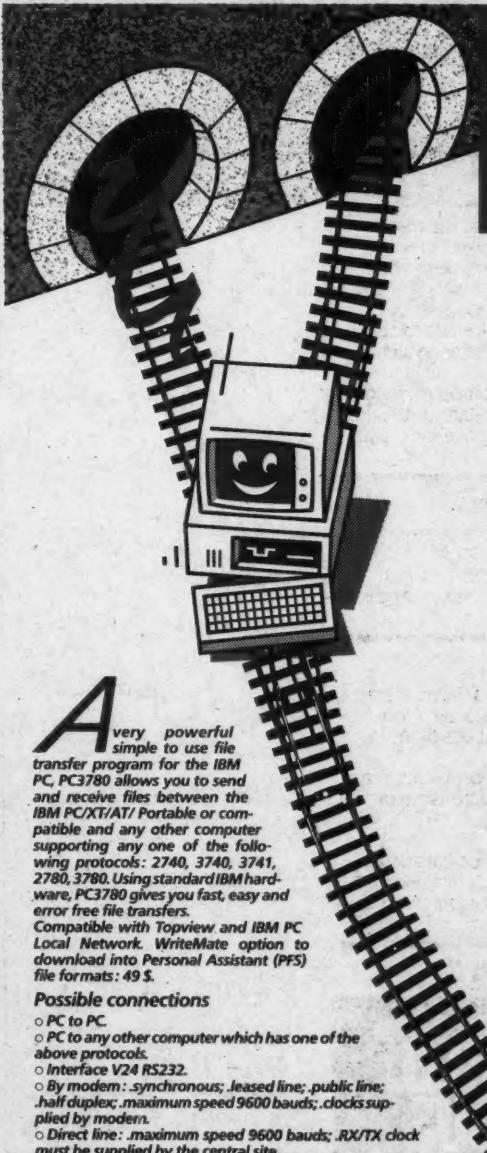
BNW, 17419 Farley Road, Los Gatos, Calif. 95030.

BNW, Inc. has announced the PGA Model 15W and 12W color graphics controllers for the Wang Laboratories, Inc. family of personal computers.

The color graphics controllers offer Autodesk, Inc. AutoCAD support. They can be configured to operate up to a resolution of 1,024 by 1,024 pixels on the Wang Professional Computer, Pick and APC family of personal computers. The controllers are single-board designs and occupy only one slot in the personal computer.

The Model 15W costs \$2,295, and the Model 12W costs \$2,595.

BNW, 17419 Farley Road, Los Gatos, Calif. 95030.



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**Minimum configuration necessary**

An IBM PC/XT/AT/Portable or compatible with at least: - 128 Kbyte memory; - one IBM BSC-ASM card; - one 320 Kbyte diskette unit or a fixed disk.



**TDT**  
EDITORS

TDT Inc., Rivergate Plaza, 444 Brickell Ave. Miami FLA 33131 Tel. (305) 372.9332.

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# ON APRIL 16, WE FOCUS ON MICROCOMPUTING.

If you're dealing in that enormous segment of the market known as micros, the April 16 issue of Computerworld Focus gives you the opportunity to reach the decision makers who buy micro products in bulk. The MIS/DP professionals. They're the ones impacted most by the ever-expanding popularity of microcomputers. The ones with responsibilities for coordinating new and existing micros into their overall information systems strategy.

They'll find the help they need in April's Computerworld Focus. Strategies for the present and the future. State-of-the-art products and technologies. Security. Vertical applications. Software. Plus networking and communications.

### **Then we'll zero in on micro storage.**

April's special section takes a good, hard look at storage. We'll compare floppies to hard disks, 3-1/2" to 5-1/4" disks, and address issues of storage efficiency. So, in the end, our readers can make intelligent choices for their companies' applications.

### **Reach the people you really want.**

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But hurry, closing is March 7.

For more information, contact Ed Marecki, Vice President/Sales, Computerworld Focus, 375 Cochituate Rd., Framingham, MA 01701, (617) 879-0700. Or call your local Computerworld sales representative.

**Issue: April 16 - Closing: March 7**

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## NEW PRODUCTS/MICROCOMPUTERS

**Practical Artificial Intelligence** has announced the DS-32 and the AP/10, coprocessors for the IBM Personal Computer and the Digital Equipment Corp. VAX, designed to support artificial intelligence.

The DS-32 coprocessor provides 32-bit processing for the IBM Personal Computer. Languages available include C, Fortran 77, LISP and Pascal. An Ada compiler will be available within the first half of the year. The DS-32 is said to run the same software products that run on engineering workstation and VAX systems. The AP/10 coprocessor installs in VAX 730 through 785 systems and requires no code changes.

The DS-32 costs \$2,700, and the AP/10 costs \$6,000.

**Practical Artificial Intelligence**, 60 Aberdeen Ave., Cambridge, Mass. 02138.

**Sigma Information Systems, Inc.** has announced the SMF/AT210-4M multifunction module for the IBM Personal Computer AT.

The module offers compatibility with both Microsoft Corp. Xenix and AT&T Unix software systems as well as with IBM PC-DOS. According to the vendor, it can turn the AT into a multiuser system. It is available with 256K bytes to 4M bytes of memory, supporting two to seven serial line devices and a parallel printer.

A SMF/AT210-4M, with 256K bytes of memory, two serial ports and one parallel port, costs \$464.

**Sigma**, 3401 E. La Palma Ave., Anaheim, Calif. 92806.

**Paradise Systems, Inc.** has announced the Short Color Card and the Short Mono Card, said to be 100% compatible short slot replacements for the IBM monochrome and color graphics display adaptors.

The cards work with the IBM Personal Computer, Personal Computer XT and AT. The Short Color Card provides a display of 25 lines of either 40 columns or 80 columns.

The Short Mono Card provides a display of 25 lines by 80 columns. Both cards include a parallel port and offer flicker-free scrolling.

The Short Color and Short Mono Cards cost \$179 and \$199, respectively.

**Paradise Systems**, 217 E. Grand Ave., South San Francisco, Calif. 94080.

**Everex Systems, Inc.** has introduced the RAM 3000 AT, the RAM 2500 AT and the Magic Card AT, three add-on boards for the IBM Personal Computer AT.

The Magic Card AT multifunction board accepts up to 2M bytes of random-access memory (RAM) and has a parallel printer port, a 9-pin serial port, a 25-pin serial port and a game port. The RAM 3000 AT and the RAM 2500 AT have capacities of 3M bytes and 2.5M bytes, respectively.

The Magic Card AT costs \$330 with no RAM installed, including software. The RAM 3000 AT costs \$280 with no memory installed, and the

RAM 2500 costs \$250 with no RAM installed.

**Everex Systems**, 47777 Warm Springs Blvd., Fremont, Calif. 94539.

**Trade Ventures International, Inc.** has announced the Elkey, an electronic key security board that plugs into a short slot of the IBM Personal Computer family or compatibles.

The key allows only au-

thorized persons to use the computer. The system manager adds or deletes names of up to 99 authorized persons whose passwords are renewed each month.

Elkey costs \$279.

**Trade Ventures International**, P.O. Box 3235, Reston, Va. 22090.

### Services

**Cambridge Planning** has added Financial, Consumer, Production and Retail soft-

ware to its Datadisk statistical information data base service.

The Financial service covers money markets, capital markets, stock markets and foreign financial conditions.

The Consumer service covers consumer spending and prices. The Production service covers industry output levels and capacity use. The Retail service covers retail sales and inventories.

The data bases are updat-  
Continued on page 90

## WHEN IT COMES TO BUILDING WIDE-AREA NETWORKS, THERE'S NO SUBSTITUTE FOR EXPERIENCE.

While any number of companies can offer to sell you a private wide-area network, one company can offer you 25 years of computer and communications experience along with it. BBN Communications.

Experience that includes designing and building the world's first packet-switching network for the U.S. government back in 1969. Since then, it has evolved into the world's largest wide-area network, the Defense Data Network, connecting over 30,000 users throughout the world.

But the U.S. Government isn't the only customer with tough networking problems that BBN has helped to solve. Numerous major corporations, among them Wang, Weyerhaeuser, and MasterCard, not to mention European giants like England's National Westminster Bank and Italy's largest corporation, ENI, have also found the answers they were looking for from us. Each came to BBN with a unique networking problem—from integrated voice/data transmission to electronic mail to credit authorization—and each came away with a unique networking solution.

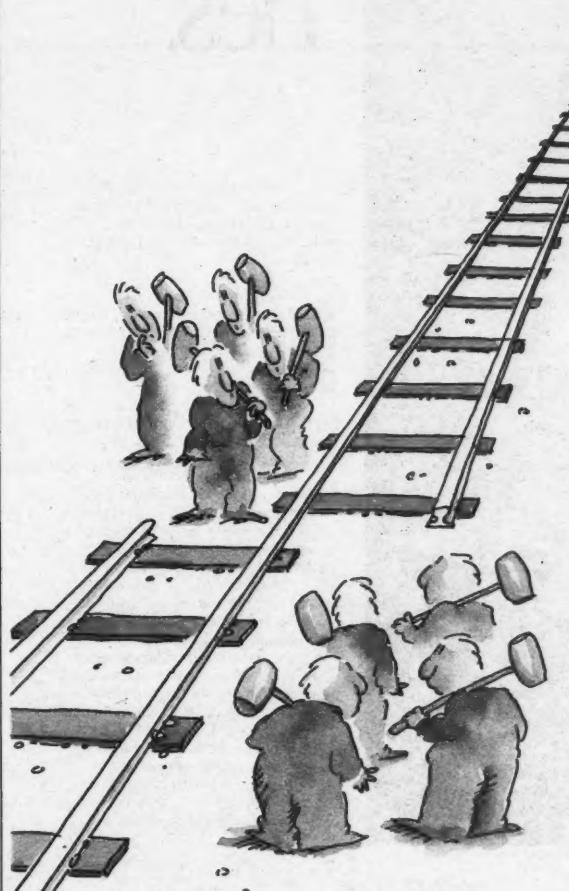
If you're going to make a major commitment to a wide-area network vendor, only three things count. Experience, experience, and experience. In wide-area networking only one company delivers it all.

## SHOULDN'T YOU BE TALKING TO BBN?

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## NEW PRODUCTS/MICROCOMPUTERS

**Continued from page 89**  
ed every month.

Datadisk runs on IBM Personal Computers and requires an IBM Color Graphics board, according to Cambridge Planning.

A year's subscription costs \$395 for the Consumer, Producer and Retail and \$695 for the Financial service, plus a one-time fee of \$200, the vendor said.

Cambridge Planning, 55 Wheeler St., Cambridge, Mass. 02138.

**Brilliant Image** has announced its **Computer Picture Services**.

The service converts graphics files from selected software packages into slide house-quality slides, overheads and handouts, the vendor said.

Supported software packages reportedly include Lotus Development Corp. 1-2-3 and Symphony; Microsoft Corp. Chart; Graphic Communications, Inc. Graphwriter and Freelance; Execu-

com Systems Corp. Impressionist; and Zenographics, Inc. Mirage and Autumn.

According to Brilliant Image spokesmen, standard turnaround time for converting a graphic file into a slide is 24 hours.

Faster turnaround times are reportedly available.

The cost for the Computer Picture Services is \$10, the vendor reported.

Brilliant Image, 141 W. 28th St., New York, N.Y. 10001.

**Auxiliary equipment**

**Information Center Services, Inc.** has introduced **Vips**, a personal computer workstation training aid.

Vips is used in the classroom to transmit the images from the instructor's machine to each of the students' monitors. According to the vendor, it takes the place of a video or overhead slide projector, eliminating the need to darken the room and simulating a one-on-one situation.

Vips license fees range from \$2,750 to \$8,950, depending on the type of monitor and the number of stations.

Information Center Services, 1111 E. Putnam Ave., Riverside, Conn. 06878.

**COMMUNICATIONS****Controllers**

**Network Development Corp.** has introduced the **DNA Gateway**, an IBM 3270 communications link said to emulate a remote IBM 3274 communications cluster controller.

DNA Gateway is based on National Semiconductor Corp.'s 32016 32-bit microprocessor.

It uses one full personal computer card slot and contains 512K bytes of random-access memory, according to the vendor.

Three configurations are reportedly available: The eight-session configuration costs \$3,995; the 16-session board costs \$4,995; and the 32-session board costs \$5,995.

Network Development, Suite 600, 81 Great Valley Pkwy., Malvern, Pa. 19355.

■

**Equinox Systems, Inc.** has introduced the **VM-48**, which is said to provide direct connection of 48 asynchronous lines from the Digital Equipment Corp. VAX Unibus to the Equinox DS-5 Data PBX or DS-15 Data PBX via a single cable.

A single two-pair cable connects the VM-48 to the Data PBX. The VM-48 occupies a single Unibus slot and is said to be equivalent to six DEC DMF-32 eight-line communications controllers. Each VAX can be up to 2,500 feet away from the Data PBX.

The Equinox VM-48 is priced at \$7,000.

Equinox Systems, 12041 S.W. 144 St., Miami, Fla. 33186.

■

**Communications Machinery Corp.** has announced the **DRN-3100** bridge, said to have separate microprocessors designed for linking two or more Ethernet local-area networks together.

The DRN-3100 allows users on one local-area network to access any resource on any other connected network. It maintains routing tables that identify resources and resource locations on all connected Ethernets. It also has a maintenance module for performance monitoring, tuning, diagnostic operation and reporting.

It costs \$6,990.

Communications Machinery, 1421 State St., Santa Barbara, Calif. 93101.



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## NEW PRODUCTS/COMMUNICATIONS

**M/A-COM Telecommunications, Inc.** has added Models 9708 and 9724 packet switches to its integrated packet network.

Model 9708 supports up to eight lines and allows users of a packet network to interface either packet assembler/disassemblers or X.25 hosts for data concentration and full switching requirements, the vendor said.

Model 9724 is said to support up to 24 lines and to function as a major node in a small network or as a concentrator/switch.

Prices start at approximately \$10,000 for the Model 9708 and \$20,000 for the Model 9724.

**M/A-COM Telecommunications**, 11717 Exploration Lane, Germantown, Md. 20874.

#### Voice/data communications

**Plescor Optronics, Inc.** has introduced the DTL-13-200 Optical Data Link.

The data link was designed to transmit data at 200M bit/sec. over distances up to 10 km between mainframes or between mainframes and minicomputers or peripheral equipment.

The DTL-13-200 is a digital transparent non-return-to-zero link, according to the vendor.

The product reportedly requires only emitter-coupled logic level at the transmitter input.

The price of the DTL-13-200 is \$14,500.

**Plescor Optronics**, 20200 Sunburst St., Chatsworth, Calif. 91311.

#### Protocol converters

**Datagraf, Inc.** has announced the Series II 3270 Coax-to-ASCII Protocol Converter.

The converter was designed for coaxial conversion to individual ASCII ports for selective connection to mainframes, minis, micros, local-area networks or packet networks. It supports IBM 3276, 3277 and 3278 terminals while allowing existing 3270 terminals to pass through data unaltered. It supports up to eight coaxial terminals. Users can select either the pass-through or the ASCII mode.

An eight-port Series II Coax-to-ASCII Protocol Converter costs \$5,400.

**Datagraf**, 6626 Silvermine Drive, Austin, Texas 78736.

**National Instruments** has announced the GPIB-110 and the GPIB-100A, two IEEE-488 interface bus extender products.

The GPIB-100A is a parallel extender that converts the 16 IEEE-488 signals to 24 parallel RS-422 signals for transmission. Data transfer

rates with a 30-meter connecting cable are 222K bit/sec. Rates are reduced as the cable length is increased.

The GPIB-110 uses a serial communications link to the distant extender. It employs a 4-bit cyclical redundancy-check code for error detection.

Prices start at \$1,195 for the GPIB-100A and at \$1,095 for the GPIB-110.

**National Instruments**, 12109 Technology Blvd., Austin, Texas 78727.

#### Software

**NCR Comten, Inc.** has announced Comten Enhanced Generation (Egen), said to decrease the time mainframes spend generating operating systems for Comten 3600/5620 communications processors.

Egen reportedly performs the network definition process 20 times faster than the current generation process. It also creates a shorter printout that eliminates redundant information.

Comten Egen works with Comten Language Support System on IBM or IBM-compatible mainframes running DOS, MVS or VM operating systems or on NCR mainframes running VRX.

Initial license fees range from \$321 to \$1,605. Continuing license fees range from \$107 to \$535 per month or \$1,177 to \$5,885 per year.

**NCR Comten**, 2700 Snelling Ave. N., St. Paul, Minn. 55113.

#### Multiplexers/modems

**Canoga Perkins** has introduced the CDS-372 fiber-optic multiplexer featuring AT&T's virtual circuit switch, Datakit.

CDS-372 is available with 36 or 72 channels, each with one data line and one control line. It handles asynchronous communications at speeds up to 100K bit/sec. and synchronous up to 76.8K bit/sec. Features include stand-alone

*Continued on page 92*

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## NEW PRODUCTS/COMMUNICATIONS

**Continued from page 91**  
or rack-mounted versions and full-duplex operation.

The price of the CDS-372 is \$3,950. Canoga Perkins, 6635 Independence Ave., Canoga Park, Calif. 91303.

**Artel Communications Corp.** has unveiled the MX327, a fiber-optic coaxial IBM 3274-compatible multiplexer.

The multiplexer is said to provide for the multiplexing of up to 32 channels of IBM 3274 I/O on a single optical or coaxial cable. It is a modular rack-mounted unit containing four individual cards. Each card supports eight channels of data.

The 32 channel unit costs \$7,600 per pair.

**Artel Communications**, P.O. Box 100, West Side Station, Worcester, Mass. 01602.

**Ark Electronic Products, Inc.** has added the **12 Thousand BPS Dial Modem**, the **9.6/208B Dial Modem**, the **8X96 Mux** and the **Mohan** to its line of data communications equipment.

The **12 Thousand BPS Dial Modem** features half-duplex synchronous communications at 12K bit/sec., autodial/autoanswer modes and an automatic fallback to 9.6K bit/sec. The **9.6/208B Dial Modem** is a half-duplex synchronous modem that transmits and receives data at 9.6K bit/sec.

The **8X96 Mux** is a statistical, character interleaved, time division multiplexer that allows up to eight ports to share a single modem line. The **Mohan** is a modem enhancer that allows asynchronous data terminal equipment to use synchronous full- or half-duplex modems.

The **12 Thousand BPS Dial Modem**, the **9.6/208B Dial Modem**, the **8X96 Mux** and the **Mohan** are priced at \$2,900, \$2,160, \$1,950 and \$495, respectively.

**Ark Electronic Products**, 1500 W. Nasa Blvd., Melbourne, Fla. 32901.

**Codex Corp.** has announced the **Codex 6216**, a software-driven digital transmission multiplexer.

Designed to operate over medium-speed digital transmission facilities at rates of 48K, 56K, 64K, 72K or 80K bit/sec., the **Codex 6216** can support up to 16 channels. Channel speeds up to 56K bit/sec. synchronous and 24K bit/sec. asynchronous can be accommodated, and four different 16-channel configurations can be programmed and brought on-line when needed.

Prices for the **Codex 6212** start at \$5,075.

**Codex**, 20 Cabot Blvd., Mansfield, Mass. 02048.

**Raycom Systems, Inc.** has added the **5100 Series Multiple TI Fiber-Optic Multiplexer (5100-T)** to its 5100 series multiplexer family.

The **5100-T** is said to be able to accept up to eight T1 data streams and time-division multiplex them over a 14M bit/sec. 50, 62.5 or 100 micron multimode fiber-optic link to a **5100-T** multiplexer up to 4 km away.

The multiplexer is transparent to all inputs and will multiplex and distribute T1 data stream over a campus or local data distribution fiber-optic network.

The four T1 configuration costs \$3,200, and the eight T1 version costs \$4,700.

**Raycom Systems**, 6395 Gunpark Drive, Boulder, Colo. 80301.

lectable rates of 1,200 bit/sec. synchronous and asynchronous in the AT&T 212A mode and from 0 to 300 bit/sec. asynchronous in the AT&T 103 mode. The unit may be used as a portable acoustic coupler or as a modem directly connected to the switched network.

A single unit costs \$795. **Anderson Jacobson**, 521 Charcot Ave., San Jose, Calif. 95131.

## SYSTEMS &amp; PERIPHERALS

## Turnkey systems

**North Star Computers, Inc.** has announced **Dimension/36**, a multiuser system that comes with California Software Products, Inc.'s **Basic/36** software system.

According to the vendor, **Dimension/36** is compatible with IBM Personal Computer-compatible productivity software and business software written for the IBM System/36.

**Dimension/36** costs from \$10,425 to \$25,195.

**North Star Computers**, 14440 Catalina St., San Leandro, Calif. 94577.

## Processors

**Integrated Business Computers** has announced the **Ensign II** series of computers designed to support multiuser, multitasking Unix applications.

It comes in three models: the **S** **Continued on page 94**

## Converting to 4300?

Make it simple with CPG!

Are you one of the 50,000 users affected by the recent announcement to withdraw support for the System/34?

Upgrading to a 4300 machine can be a difficult and costly exercise.

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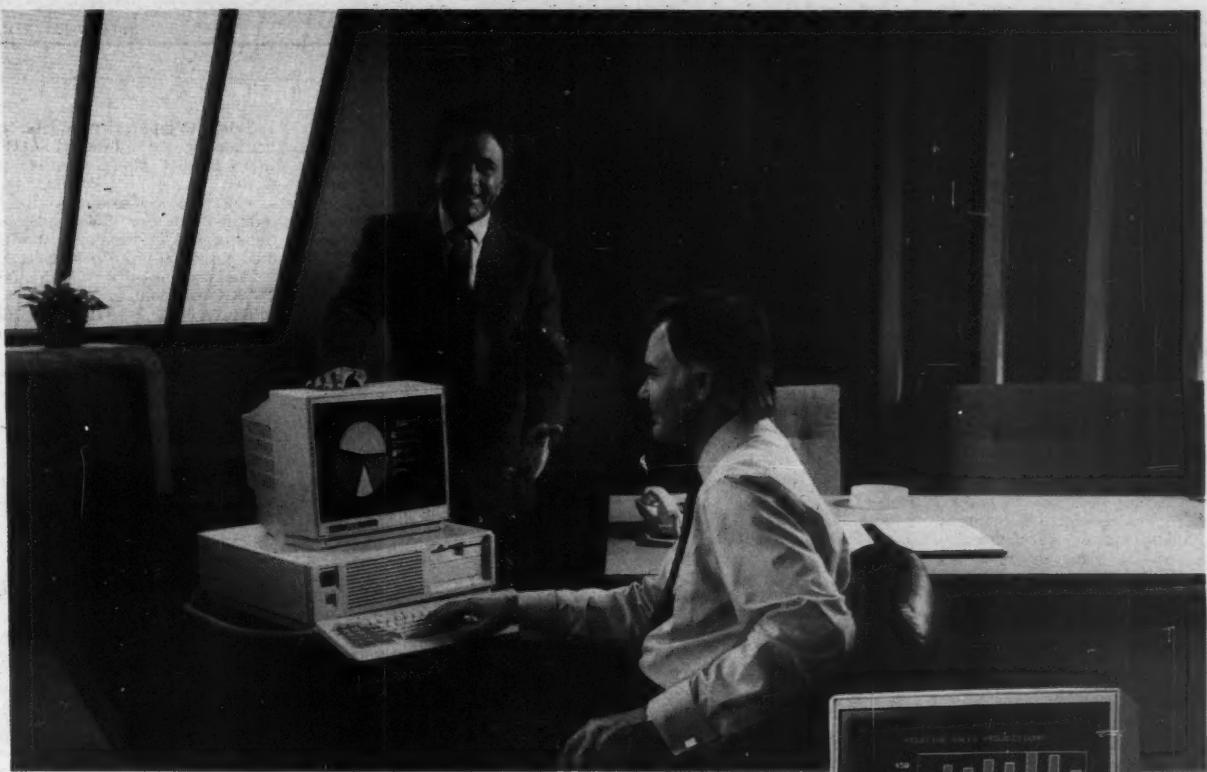
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Introducing the Tandy 3000, the affordable alternative to the IBM® PC/AT. Here's the power you need to manage your business, to network computers, or to create a multiuser system for your office.

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The Tandy 3000 uses the advanced MS-DOS 3.1 operating system. And since the Tandy 3000 is compatible with programs designed for the PC/AT, as well as the PC/XT, it cuts through today's software confusion. Choose from advanced word-processing packages, database management and powerful accounting software.

#### The power to share

The Tandy 3000 is also designed to use the forthcoming XENIX 5.0 multi-user operating system. Two to six people in an office can use the 3000 simultaneously with low-cost data terminals.

In offices already equipped with MS-DOS computers, the Tandy 3000 is the link that brings them all together. Using our ViaNet local area network, the Tandy 3000's high speed is available to all network users.

The Tandy 3000 is your affordable solution for office automation.

#### Designed for high performance

The Tandy 3000 comes with an 80286 CPU for the ultimate in speed and performance. Its 16-bit architecture operates at 8 megahertz—twice that of the industry standard.

The Tandy 3000 comes with one-half megabyte of main memory (512K RAM). Memory can be expanded to 640K without using an expansion slot. Total internal memory can exceed 12 megabytes (under XENIX).

As for storage, the Tandy 3000 (25-4001, \$2599) comes with a high-capacity, 5 1/4" floppy disk drive. For the utmost in compatibility, this drive can read 1.2-megabyte and 360K formats for use with IBM PC diskettes.

#### Extra storage and expandability

For maximum capacity, choose the Tandy 3000 HD (25-4010, \$3599) with a built-in 20-megabyte hard disk drive.

Both versions of the Tandy 3000 feature a built-in real-time clock, a serial/parallel interface, and ten expansion slots, including seven IBM PC/AT-compatible slots, two PC/XT-compatible slots and a PC/XT-compatible half-slot for the serial/parallel interface.



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## NEW PRODUCTS/SYSTEMS &amp; PERIPHERALS

**Continued from page 92**

6810, the D-6810 and the T-6820. The S-6810 supports eight serial ports, 1M byte of memory, three ST506 disk drives and an optional Motorola, Inc. 68881 floating-point processor.

The D-6810 supports 16 serial ports. The T-6820 is a 32-bit Motorola 68020-based system that can support 48 serial ports and 8M bytes of memory.

Prices start at \$5,995.

Integrated Business Computers, 21621 Nordhoff St., Chatsworth, Calif. 91311.

**Emac, Inc.** has introduced the E-Pac 1000 single-board computer.

The E-Pac 1000 comes equipped with 16 analog-to-digital channels, eight digital inputs, eight digital outputs, real-time clock and watchdog timer. There is memory space for 16K to 24K bytes of erasable, programmable read-only memory and for 8.25K to 16.25K bytes of static random-access memory. It comes with an RS-232 port, seven switches for program options and selections.

The E-Pac 1000 costs \$199.95.

Emac, 1400 W. Main St., Carbondale, Ill. 62901.

**Telisis Systems Corp.** has introduced the EDA-620 Routing Accelerator, a dedicated Motorola, Inc. 68020-based processor designed for use with Telisis EDA-300 and EDA-700 design workstations.

The accelerator includes its own 85M-byte disk and 2M-byte main memory. It is equipped with an Ethernet-based communications link. Multiple routing tasks may be processed serially or in a multitasking environment.

An EDA-620 Routing Accelerator, with Telisis routing software and Ethernet link, costs \$47,900.

Telisis, 2 Omni Way, Chelmsford, Mass. 01824.

**Dataram Corp.** has announced the DR-224 8M-byte memory array board for Digital Equipment Corp.'s Microvax II.

The DR-224 is a quadwide printed-circuit board that uses 256K bytes by 1 byte of dynamic random-access memory. It will operate either with or in place of DEC's Model MS630 memory array module. It provides the Microvax II with a memory capacity of 16M bytes, using two DR-224 memory arrays. It has on-board parity generation and checking.

The board costs \$3,195.

Dataram, Princeton Road, Cranbury, N.J. 08512.

#### Data storage

**Distributed Logic Corp.** has announced the DQ235 SMD-compatible disk controller for use with Digital Equipment Corp. LSI-11 through LSI-11/73 computers.

The controller is said to allow users to interface one or two SMD disk drives to provide up to 300M bytes of capacity.

It features a choice of switch-selectable RK06/RK07 subsystem emulations. The two drives may be formatted for up to eight logical units.

The DQ235 offers a 56-bit error check and correct polynomial for de-

tecting and correcting data errors up to 11 bits in length.

The controller costs \$1,775.

Distributed Logic, 1555A Sinclair St., Anaheim, Calif. 92806.

**Emulex Corp.** has introduced the MD21 ESDI/SCSI disk controller said to be able to interface any two large-capacity, serial mode ESDI 514-in. Winchester drives to the small computer systems interface bus.

According to the vendor, the MD21 disk controller features a 32K-byte buffer, error-free media functionality, direct-track addressing and autodefect.

The price of the MD21 disk controller is \$395.

Emulex, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

#### Terminals

**Epic Data, Inc.** has added the 1647-250 Hand-held Portable Terminal and the 1647-251 Expanded Hand-held Portable Terminal to its 200 series of portable display terminals.

Both units are designed for data collection applications. They are battery operated and support bar code and keyboard data entry.

Both support point-to-point, multidrop, RS-232C, Epic party line and modem communications.

The terminals feature an attachable 24-column impact printer or 40-column portable printer.

The 1647-250 is priced from \$1,142, and the 1647-251 is priced from \$1,612, the vendor said.

Epic Data, 7280 River Road, Richmond, B.C., Canada V6X 1X5.

**Telex Computer Products, Inc.** has announced the Telex 274-61C, an IBM 3274/61C plug-compatible controller.

The unit is said to support up to 16 attached Telex or IBM display stations or printer terminals. It offers dual-host/dual-protocol support.

The base unit price for the Telex 274-61C is \$7,000.

Telex, 6422 E. 41st St., Tulsa, Okla. 74135.

#### Printers/plotters

**Tektronix, Inc.** has announced Options 13 and 23 for its 4634 imaging hard-copy unit.

The two options are interfaces said to enable users to print detailed gray-scale images from color and monochrome 50Hz and 60Hz IBM 5080 Graphics Systems, respectively.

	WORDSTAR 2000 PLUS REL. 2	MICROSOFT WORD VERS. 2.0	WORD PERFECT VERS. 4.1	MULTIMATE ADVANTAGE VERS. 3.5	DISPLAY- WRITE 3 VERS. 1.0
FEATURE	1	2	2	1	4
Installation	1	2	3	2	3
Documentation	1	2	2	3	1
Ease of Learning	1	2	1	4	2
Functionality	2	3	2	4	2
Performance	1	3	2	2	3
Document Control	1	1	3	3	3
Text Control	2	1	2	3	3
Page Control	2	2	3	2	1
Micro Editing	1	1	2	2	4
Global Control	2	3	2	4	3
Page Layout	3	2	3	3	4
Printing	1	1	2	2	2
Advanced Features	3	3	3	5	2
Writing Aids	1	1	3	2	2
Printers/Fonts Supported	1	4	3	5	2
Connectability	1	1	1	1	1

Note: The comparison numbers represent the relative ranking of each package compared to the others. The package with the highest ranking is given a 1. If packages rank equally, they are assigned the same ranking number.

Source: InfoCorp

## NEW PRODUCTS/SYSTEMS &amp; PERIPHERALS

The basic price of the 4634 is \$8,300. Options 1 and 23 are available at no additional charge.

Tektronix, P.O. Box 1700, Beaverton, Ore. 97075.

**Primages, Inc.** has announced its **100 Daisy/Grapher Printer**, a daisy-wheel printer said to perform graphics as well as letter-quality printing.

The printer incorporates Primages' stepper-motor and print-in-flight technology utilizing a 100-spoke daisywheel. According to the vendor, the printer prints 100 char./sec.

The Primages 100 Daisy/Grapher Printer is priced at \$1,895, the vendor said.

Primages, 620 Johnson Ave., Böhem, N.Y. 11716.

**BBC Brown Boveri** has introduced the **Model SE 293** B-size desktop plotter.

The plotter is said to feature a built-in chart advance and paper cutter for automated operation as well as a plotting surface that is inclined at 30 degrees. Other features include electrostatic hold-down and eight pens in three different types. The plotter has an RS-232C or general-purpose interface bus. It is available with either HPGL or BBC graphics language.

The Model SE 293 costs \$3,495. BBC, 2150 W. 6th Ave., Broomfield, Colo. 80020.

## Power supplies

**Merrimack Magnetics Corp.** has introduced the **Mac-Gard** series of line conditioners, which are said to

provide computer-grade power to any microprocessor-based equipment.

The units are offered in power ratings from 250VA to 3,000VA, Merrimack Magnetics said.

The units reportedly develop complete isolation from the power line by attenuating electrical noise in both common and transverse mode at better than 120db and 60db, respectively.

Mac-Gard also meets the IEEE 587 specification for dissipation of high-energy spikes, according to company spokesmen.

All models come in either plug-compatible or hard-wired configurations.

Prices start at \$258, the vendor said.

Merrimack Magnetics, 121 Hale St., Lowell, Mass. 01851.

**Microamerica and Computer Accessories Corp.** have introduced a line of uninterruptible power supplies called **Power Savers**.

Power Savers are said to protect the computer system and data from problems such as voltage dips, surges and spikes.

If commercial power fails, Power Savers reportedly begin supplying steady, noise-free ac power to the computer within 4 msec.

Power Savers are said to provide up to 35 minutes of battery backup and are available in 400VA (the U400), 800VA (the U800) and 1,000VA (the U1000) models.

Prices for the U400, U800 and U1000 are \$699, \$999 and \$1,099, respectively.

Microamerica, 33 Boston Post Road W., Marlboro, Mass. 01752.

## PRICE REDUCTIONS

**Pecan Software Systems, Inc.** is reducing the cost of **UCSD Pascal**.

This UCSD Pascal release is said to provide Intel Corp. 8087 support, binary coded decimal, dynamic memory management, separate compilation, data hiding, multitasking and native code generation, according to Pecan Software.

The software is said to run under both the IBM PC-DOS operating system and Microsoft Corp.'s MS-DOS operating system.

UCSD Pascal costs \$79.95, the vendor said.

A package that includes UCSD Pascal, configuration tools, symbolic debugger, application services interface, program analysis tool kit, disk recovery tool kit and print spooler is available for \$179.95.

Pecan Software Systems, 1410 39th St., Brooklyn, N.Y. 11218.

**Wyse Technology, Inc.** has announced a price reduction on its **WYse personal computer line**.

The IBM Personal Computer-compatible **WY-1100-1** system now costs \$1,264. The model **WY-1100-2** IBM Personal Computer XT-compatible system now costs \$2,135. There is a new 20M-byte model, the **WY-1100-20**, that is priced at \$2,310.

Wyse Technology, 3040 N. First St., San Jose, Calif. 95134.

**Cambridge Computer Graphics** has reduced the price of its **Micro 1024** monochrome graphics display.

The Micro 1024 is Microsoft Corp. MS-DOS compatible. It has a 20-in. display with a resolution of 1,024 by 780 pixels.

The reduced price is \$2,995.

Cambridge Computer Graphics, 6201 Ascot Drive, Oakland, Calif. 94611.

**BCH Equipment Corp.** has reduced the price on **Models 1 and 2** of its three-model **48/208AB** series 4.8K bit/sec. modems.

All three models are compatible with AT&T 208A and B and offer simultaneous physical connection to both dial-up and leased lines for added backup protection.

Model 1 costs \$1,295. Model 2 costs \$1,345.

BCH Equipment, 6950 Bryan Dairy Road, Largo, Fla. 33543.

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*Introducing WordStar 2000 Plus Release 2, the new and improved software that topped InfoCorp's chart of word processing packages.*

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## NEWS



## BOOK REVIEWS

## COMPUTERS AND COMMUNICATIONS

By Koji Kobayashi

For 57 years, Koji Kobayashi has worked at Japan's NEC Corp., the last two de-

cades as the company's chief executive.

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because his words were automatically translated into Russian.

The importance of this book is not so much whether the ideas presented turn out to be right or wrong — its importance is that the head executive of a major company has a vision of how technology can work to integrate the world.

*Hardcover, 190 pages, \$16.95, ISBN 0-262-11111-X, by The MIT Press, MIT, Massachusetts Ave., Cambridge,*

*Mass. 02142.*

## MATHEMATICAL PEOPLE

Edited by Donald Albers and G. L. Alexanderson

If mathematics drives computers, then the men and women profiled in this book are at the engines of an industry.

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One of these is Hungarian-born John Kemeny, chairman of Dartmouth College's department of mathematics in the early 1960s when he and Tom Kurtz coauthored the Basic language.

Despite the evidence that this collection of profiles provides, Graham sometimes doubts the capacity of mankind for understanding mathematical and computer complexities. He says, "Our brains were designed to keep us out of the rain, pick berries and keep us from being killed. ... Now it has got a whole new set of challenges — and we're getting better, but we're still a long way from being good at them."

*Hardcover, 372 pages, \$24.95, ISBN 0-8176-3191-7, by Birkhauser Boston, 380 Green St., Cambridge, Mass. 02139.*

## TECHNOMICS

By William Inmon

A widely published author of trade journal articles, William Inmon takes to book form to explore market realities and computer technology.

The wealth of figures and data gives a good statistical underpinning to his discussion of who is buying and selling technology, who is succeeding or failing and what economic forces are shaping the industry.

*Hardcover, 361 pages, \$25, ISBN 0-87094-688-9, by Dow Jones-Irwin, 1818 Ridge Road, Homewood, Ill. 60430.*

## COMPUTER CRIME AND BUSINESS INFORMATION

By James Schweitzer

From the Systems Security Technology Manager for Xerox Corp. comes a practical guide for managers. James Schweitzer offers the information resource management approach to making appropriate security decisions.

*Hardcover, 195 pages, \$29.95, ISBN 0-444-00972-8, by Elsevier Science Publishing Co., 52 Vanderbilt Ave., New York, N.Y. 10017.*

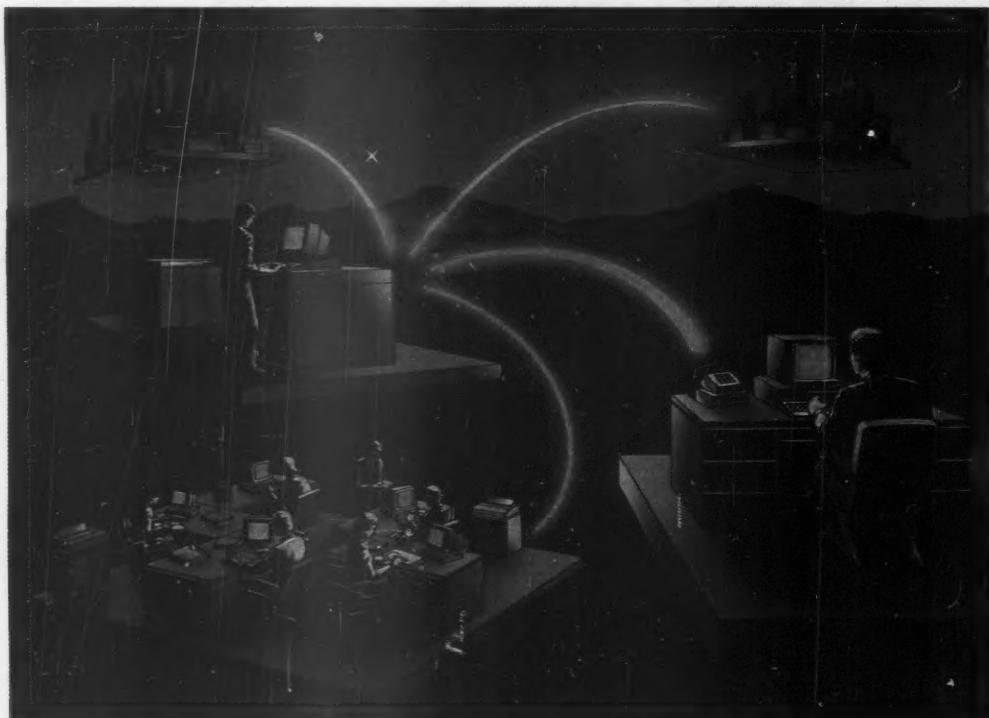
## DBASE III

By M. de Pace

This how-to book guides programmers, analysts, data base administrators and others to a fast start using DBASE III, the data base package from Ashton-Tate.

*Hardcover, 180 pages, \$24.95, ISBN 0-442-22296-3, by Van Nostrand Reinhold Co., 155 Fifth Ave., New York, N.Y. 10003.*

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## NEWS



## CALENDAR

## WEEK OF MARCH 2

**MARCH 4-6, PARIS — Securicom '86 — Fourth Worldwide Congress on Communications Security and Protection.** Contact: Securicom-SEDEP, 8 Rue de la Michodiere, 75002 Paris, France.

**MARCH 5-7, ATLANTIC CITY — Expo II.** Contact: Bill Thurman, Thurman Marketing Services, Suite 201, 22982 La Cadena, Laguna Hills, Calif. 92653.

**MARCH 5-7, SCOTTSDALE, ARIZ. — The Society for Information Management Institutional Member Conference.** Contact: Society for Information Management, 111 E. Wacker Drive, Chicago, Ill. 60601.

## WEEK OF MARCH 9

**MARCH 9-12, SAN DIEGO — Fourth Annual Computer-Based Training Conference & Exposition.** Contact: Val Adell, Conference Registrar, Weingarten Publications, Inc., 38 Chauncy St., Boston, Mass. 02111.

**MARCH 10-11, CLEVELAND — DBMS Software: Functions — Package Comparison.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138. Also being held March 13-14 in Detroit.

**MARCH 10-12, DES MOINES, IOWA — Systems Project Management.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138. Also being held March 31-April 2 in Toronto.

**MARCH 10-12, CINCINNATI — Effective Systems Analysis and Design: Tools and Techniques.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

**MARCH 10-12, WASHINGTON, D.C. — Fourth National Conference on Personal Computers in Government.** Contact: Conference Manager, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20093.

**MARCH 10-14, DALLAS — Second International Integrated Services Digital Networks Exposition.** Contact: Danae Fasano, Conference Coordinator, Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134.

**MARCH 10-14, NEW YORK — Modern Structured Analysis Workshop.** Contact: Palmer Consulting, 353 W. 12th St., New York, N.Y. 10014.

**MARCH 12-14, DETROIT — Artificial Intelligence for the Automotive Industry — The Demystification.** Contact: Dale Mason, Technical Activities Department, Society of Manufacturing Engineers, Computer and Automated Systems Association of SME, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

**MARCH 13, NEWTON, MASS. — AWC — Where's the Money: Where are the High-Paying Jobs on the Fast Track?** Contact: Deborah Dupee, Program Director, Association

for Women in Computing, Suite 21, 66 Chiswick Road, Brookline, Mass. 02146.

## WEEK OF MARCH 16

**MARCH 17, BOSTON — Establishing the Executive Workstation.** Contact: Diane Rodgers, DMR Associates, Inc., 57 River St., Wellesley Hills, Mass. 02181.

**MARCH 17-19, HONG KONG — Conference On Computer Control, Audit & Security in Banking and Finance.** Contact: Conference Chairman, P.O. Box 212, Georgetown, Ont., Canada L7G 4Y5.

**MARCH 17-20, WASHINGTON, D.C. — Software Development for Government.** Contact: Conference Manager, U.S. Professional Develop-

See CALENDAR page 98

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## CALENDAR from page 97

ment Institute, 1620 Elton Road, Silver Spring, Md. 20903. Also being held March 24-27 in Los Angeles, and March 31-April 3 in Atlanta.

MARCH 17-21, BALTIMORE — **Basic Systems Analysis.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

MARCH 17-21, BOSTON — **James Martin's Productivity Seminar.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402. Also being held March 24-28 in Washington, D.C.

MARCH 17-21, MILWAUKEE — **Test Data Acquisition and Processing for Instrumentation Applications.** Contact: John T. Snedeker, Program Director, Center for Continuing Engineering Education, Uni-

versity of Wisconsin-Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

MARCH 18, SAN JOSE, CALIF. — **U.S. Invitational Computer Conference Series.** Contact: Suzanne Hubner, U.S. Conference Director, The Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626. Also being held April 2 in Nashua, N.H.

MARCH 18-20, ALBUQUERQUE, N.M. — **Integrated Fiber-Optic Technology Training.** Contact: Linda Castle, Optoelectronic System Consultants, P.O. Box 35525, Albuquerque, N.M. 87176.

MARCH 18-21, LAS VEGAS — **Check Processing.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

MARCH 19-20, NEW YORK — **The 1986 Strategic Planning Conference.** Contact: The Conference Board, Inc., P.O. Box 4026, Church St. Station, New York, N.Y. 10261.

MARCH 19-21, LAS VEGAS — **CDLA Spring Meeting.** Contact: Dianne L. Sims, Manager of Convention Planning, Computer Dealers and Lessors Association, Inc., 1212 Potomac St. N.W., Washington, D.C. 20007.

MARCH 19-21, BLACKSBURG, VA. — **Personal Computer Interfacing for Scientific Instrument Automation.** Contact: Dr. Linda Leffel, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

## WEEK OF MARCH 23

MARCH 24-26, CHICAGO — **Systems One Conference and Exposition.** Contact: Michael A. Tew, Technical Activities Department, Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

MARCH 24-26, LAS VEGAS — **Fifth Annual International Spectrum USA.** Contact: Amy Krainock, International Data Base Management Association, Suite 104, 9740 Appaloosa Road, San Diego, Calif. 92131.

MARCH 24-26, LAUREL, MD. — **Association for Computing Machinery's Conference on Ada Use in Focus: Practical Lessons in Perspective.** Contact: Connie Finney, Johns Hopkins University, Applied Physics Laboratory Computer Society, Johns Hopkins Road, Laurel, Md. 20707.

MARCH 24-27, SINGAPORE — **Artificial Intelligence '86 Conference: AI and its Applications — A State of the Arts Review.** Contact: John Tagler, Elsevier Science Publishers, 52 Vanderbilt Ave., New York, N.Y. 10017.

MARCH 26-27, CAMBRIDGE, MASS. — **The Lotus Developer Conference.** Contact: Mark Scapicchio, Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, Mass. 02142.

## WEEK OF MARCH 30

MARCH 31-APRIL 1, NEW YORK — **Software Tools Conference on Artificial Intelligence/Expert Systems.** Contact: Conference Office, Software Tools Conference, Suffolk University, Boston, Mass. 02108.

MARCH 31-APRIL 2, RICHMOND, VA. — **The Annual Parnassus Management Conference.** Contact: Parnassus, Inc., 100 Boylston St., Boston, Mass. 02116.

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#### General Sessions

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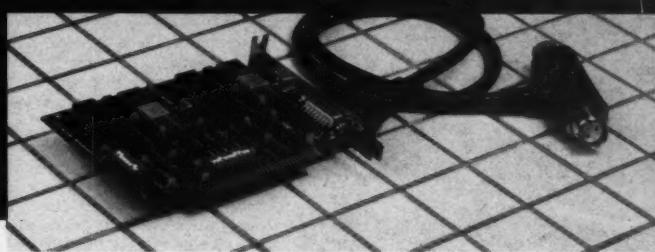
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## COMPUTER INDUSTRY

## Re-Orienting chip business

From page 126

pitas, Calif., received its first wafers from Toshiba Corp. in 1981.

Today the company has a second-sourcing agreement with Toshiba and is conducting some joint product development. Last year, LSI launched a Japanese subsidi-

ary, and next month the company will break ground on a 17-acre semiconductor plant in conjunction with Kawasaki Steel Corp. in Tsubaki, Japan.

### Other affiliations

Other chip firms, such as Texas Instruments, Inc. and Fairchild Semiconductor, have also established Japanese manufacturing facilities. There is also speculation that a Japanese affiliation can be expected

soon from National Semi.

More than 60,000 jobs were lost in the semiconductor industry last year, and despite recent indications that chip orders are on the rise, there is a long way to go before the industry recovers from last year's nosedive.

As AMD seems to have indicated, the industry cannot bank on winning the trade battle by pointing fingers at the Japanese. The issue is no longer winning the trade battle, but surviving.

## U.S. chip makers join forces with Japanese

By Maura McEnaney

SUNNYVALE, Calif. — In the midst of allegations regarding trade practices by Japanese semiconductor firms, U.S. chip makers are rapidly joining forces with their Japanese counterparts.

Advanced Micro Devices,

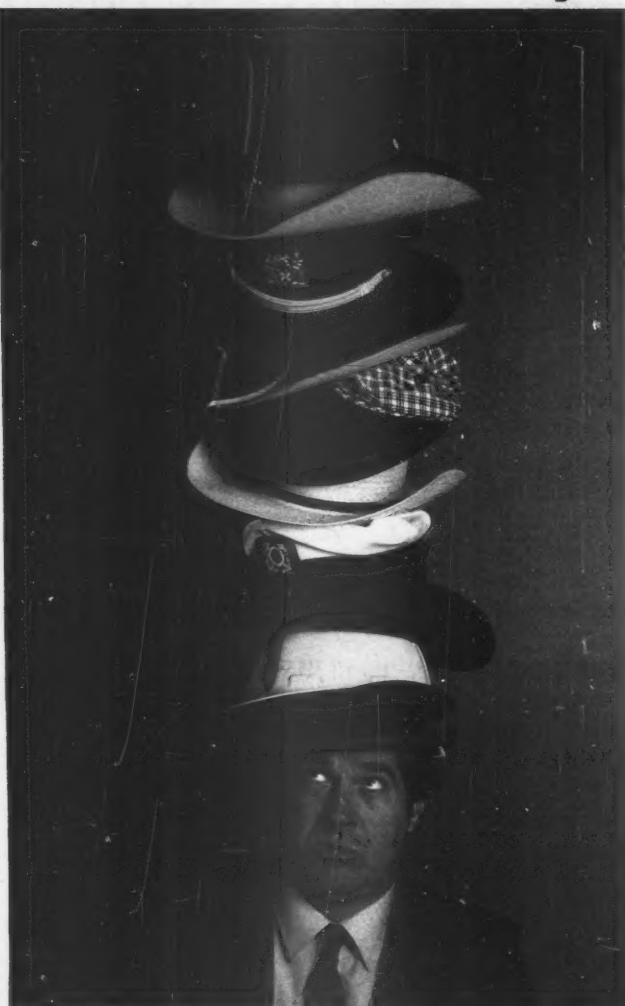
Inc. (AMD) recently announced a joint technology agreement with Sony Corp. that will allow the companies to exchange chip designs and to market resulting products worldwide. The agreement allows Sony to buy AMD chips and sell them under the Sony label, while AMD has the same rights to Sony chips.

The two companies also say they plan to develop joint standards for the design of future very large-scale integration circuits.

Industry observers appear surprised at the announcement, primarily because of AMD Chairman Jerry Sanders' open criticism of Japanese trade practices. AMD is one of three U.S. chip companies participating in a complaint to the U.S. Trade Commission charging Japanese companies with the illegal dumping of erasable programmable read-only memory chips.

**Computer industry section begins on page 126**

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But the Sony alliance will give AMD access to the \$11 billion Japanese market, which is expected to exceed the U.S. market this year for the first time, says Matt Crugnale, president of Crugnale & Associates of Mountain View, Calif.

Dataquest, Inc. senior analyst Sheridan Tatsuno says partnerships like the AMD-Sony alliance are on the rise. Since 1980, Japanese semiconductor equipment manufacturers have engaged in 185 deals with U.S. chip firms, according to Dataquest. Last year alone, 71 deals were announced and more are on the way.

"It's not the end of the wave by any means," says Tatsuno, who expects a similar announcement from National Semiconductor Corp. within the next few months.

Rumors are also surfacing concerning merger discussions between prominent U.S. chip maker Motorola, Inc. and Toshiba Corp., but Motorola officials say the subject was only "hypothetically discussed" in an in-house memo (CW, Feb. 17).

Andrew Rappaport, president of The Technology Research Group, Inc. in Boston, says he believes that U.S. firms are seeking Japanese manufacturing capabilities in exchange for U.S. technology. "U.S. semiconductor manufacturers are frustrated by their inability to compete on a manufacturing level," Rappaport says.

## COMPUTER INDUSTRY

## Novell approach in local net arena

From page 126

IBM Personal Computer local-area networks. Nestar Systems, Inc. is currently the only other local-area network vendor offering fault tolerance.

Users and reviewers have almost unanimously praised Novell's Netware for its user interface, screen presentation, security and file sharing.

"We are using Novell products primarily to turn personal computers into departmental-type processors," says Jeff Farris, office automation manager for the Southland Corp.

Southland chose Novell mainly for the functionality and hardware independence. "We looked at their long-term direction, the fact that they were supporting several different hardware varieties and decided that would minimize our risk," Farris says.

Analysts say they expect that Novell's continuing product development will spur continued growth. "Novell has a much better chance than other network vendors of surviving because they have been offer-

ing higher performance and IBM compatibility," says Eric H. Killorin, president of Hyatt Research Corp., a research firm based in Andover, Mass. "Novell is farther ahead in easy access to shared information than any other vendor," Killorin adds.

If 1986 turns out to be the "Year of the Local-Area Network," as pundits put it, then it will assuredly be a good year for Novell. The IBM Token-Ring network, announced last year and set to ship by the second quarter, is expected to answer many of the "What should I buy?" questions, leaving the question, "Whom should I buy from?" Novell says it hopes to be well positioned to answer that question.

Besides having sophisticated software, Novell boasts aggressive, well-funded marketing. Its creativity shows up in advertising where the

firm uses quips such as "Netware: Dedicated to Serve all Lankind" and "Let's Get Connected."

Novell's Noorda says he agrees with users and analysts, claiming the firm has grown due to the growth of the local-area network market, the increased acceptance of Novell's family of products, an aggressive and effective sales and service system and, most of all, Novell employees.

## From the ashes

Novell rose from the ashes of Novell Data Systems, Inc., a network developer that was owned by Safeguard Sciences, in January 1983, and Noorda took over the Novell helm in February 1983. "After a while, as might often happen, the investors' fatigue sets in, and they hadn't reached some of their goals so they began to shut it down in the ear-

ly part of 1982," Noorda says. "They came to me and asked me if I could do something with it, and I did," he adds.

Noorda, a longtime champion of open management, regards every employee as important, and the firm even dubs its shipping team "The Orem Bay Packers." Novell also offers its employees training in network technology.

Noorda, 61, has an extensive background in the computer industry. He graduated with a degree in electrical engineering from the University of Utah in 1949 and later worked for General Electric Co. in process computer activities from 1949 to 1970. Noorda later became president of General Automations Systems Industries, a peripherals subsystems manufacturer and Boschart, Inc., a power supply systems manufacturer.

## TI files complaint of chip technology patent violations

By Edward Warner  
Computerworld News Service

DALLAS — A Texas Instruments, Inc. complaint, filed recently with the International Trade Commission (ITC), is only the latest salvo the company has fired across the bows of nine Asian chip makers that TI claims are using patented TI technology to make dynamic random-access memory (RAM) chips.

The complaint, filed earlier this month under Section 337 of the Tariff Act of 1930, asks the ITC to investigate TI's claim and issue a permanent exclusion order preventing dynamic RAM chips that are manufactured by the alleged offenders from being sold in the U.S. Only a week before, TI filed a patent infringement lawsuit asking that a federal court place an injunction against the same vendors.

Corporate spokesman Stan Victor says TI believes that any maker of dynamic RAM chips other than itself is violating TI patent rights. "We say we have eight basic patents that cover the manufacturing of dynamic RAM chips," Victor says. "We believe you can't build a dynamic RAM chip without using this technology."

Named in both the suit and the complaint are Fujitsu Ltd., Hitachi Ltd., Oki Electric Industry Co., Toshiba Corp., Matsushita, Mitsubishi Corp., Sharp Electronics Corp. and NEC Corp., all Japanese firms. Also named is Samsung Semiconductor and Telecommunications, a South Korean chip manufacturing firm.

TI is one of the U.S. chip vendors hardest hit by the 1985 recession in that market, posting an \$118.7 million loss on sales of \$4.9 billion.

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## COMPUTER INDUSTRY

## Convergent, David Systems agree to license net technology

Will link Ngen units over phone wire

By Eddy Goldberg

SAN JOSE, Calif. — Moving to expand its networking options, Convergent Technologies, Inc. recently reached an agreement in principle to license technology that will link its Ngen workstations over standard telephone wire.

The agreement was reached with David Systems, Inc. of Sunnyvale, Calif., which adapted its integrated voice/data network technology for Ngen.

The product, an outgrowth of the David Information Manager voice and data switch, will allow Convergent to offer its existing 1.8M bit/sec. local-area network over phone lines instead of the RS-422 cable currently used.

Under the agreement, Convergent will be licensed to manufacture the product using the technology developed by David.

### 'A unique hook'

"David represents a unique hook into the telephone world for Convergent," according to industry analyst Doane Perry of International Data Corp. in Framingham, Mass. "Along with its recent 3Com Corp. merger, Convergent completes the triad and becomes a systems integrator

— the type of firm that will survive the shakeout in the local-area network industry."

The deal opens up a larger market for Convergent based on the use of in-house wiring for integrating high-speed voice and data communications at the desktop level. "It gives us a big leg up on the competition without requir-

ing the mythical voice/data workstation," said Eric Carlson, vice-president and general manager of Convergent's Cluster Division.

For David, the deal marks the firm's first major foray into the information processing marketplace. The company had been concentrating its efforts among communications companies. President

and Chief Executive Officer Luigi Mercurio said that David is trying to penetrate the market from as many directions as it can, and he hinted at similar deals in the near future. Carlson and Mercurio said the agreement was not connected with the recent merger of Convergent and 3Com Corp. [CW, Dec. 2]. David licenses 3Com software

for use with its own Ethernet boards.

But Carlson noted that the two firms may intermix 3Com's open Ethernet technology with Convergent's proprietary Ngen local-area network, and, if appropriate, David technology could come into play to provide communications over standard phone lines.

## Cullinet settles civil dispute

WESTWOOD, Mass. — Cullinet Software, Inc. recently agreed to pay the U.S. government a \$615,000 settlement to resolve a civil dispute in which the government charged that Cullinet had not disclosed various discounts that it had been providing to corporate customers.

Cullinet, however, said it settled with the government only to end the 1½-year-old dispute. The company maintains that it did not violate its contract to sell software to the government.

The U.S. attorney's office in Boston said the U.S. General Services Administration claimed that Cullinet did not make discounts available to it while the company was selling discounted software to its corporate customers from 1980 to 1984.

Cullinet said the software sold to the government was different from the discounted packages it sold in the commercial market.

— Rosemary Hamilton

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## COMPUTER INDUSTRY

## Uccel grows with 42% profit increase, 18% gain in revenue

### Reports 1985 sales of \$204.7 million

By Clinton Wilder

Continuing its record of consistent growth, Uccel Corp. recently reported a 42% comparable year-to-year profit increase in 1985 on an 18% gain in revenue.

The Dallas-based systems and applications software house earned \$11.2 million, or 68 cents per share, from continuing operations for the year, compared with \$7.9 million, or 49 cents per share, in 1984.

Uccel had extraordinary credits of 30 cents per share in 1985 and 25 cents per share in 1984. Sales rose

from \$173.4 million to \$204.7 million in 1985.

Uccel's fourth-quarter income before nonrecurring credits rose 27% to \$5 million, or 30 cents per share. Fourth-quarter sales increased 21% to \$59 million.

Among other companies recently reporting financial results were the following:

• **Perkin-Elmer Corp.** Per-

kin-Elmer reported that its second-quarter profit and revenue remained essentially flat. For the quarter ended Jan. 31, the Norwalk, Conn., systems vendor earned \$19.1 million, or 43 cents per share, compared with \$18.7 million, or 42 cents per share, a year earlier. Revenue dipped from \$329 million to \$326 million. The company said orders

for computers, analytic instruments and surface technology systems were higher than in the previous year but that its semiconductor equipment business remained sluggish. Chairman and Chief Executive Officer Horace G. McDonnell noted a \$22 million order backlog, saying, "I don't see this as basic turnaround in business conditions, but it is an encouraging sign."

• **Concurrent Computer Corp.** In its first quarter as an independent firm, the former Perkin-Elmer Data Systems Group reported that earnings remained flat on a 3.8% revenue gain compared with the year-earlier period. Concurrent, spun off by PE in November, earned \$3.3 million, or 35 cents per share, on sales of \$69 million in the second quarter ended Jan. 31. Concurrent concluded its initial public offering of 1.3 million shares Feb. 3 and will be traded on the national over-the-counter market.

• **Computer Consoles, Inc.** The Rochester, N.Y.-based Computer Consoles (CCI) reported that its loss exceeded its revenue for the fourth quarter, primarily because of \$22.8 million in one-time charges for consolidation of operations and inventory write-downs.

CCI posted a \$27.6 million, or \$2.31 per share, loss in the fourth quarter on sales that declined 26% from the year-earlier quarter to \$25.4 million.

For the year, CCI reported a pretax loss of \$58.8 million and a net loss of \$41.9 million, or \$3.61 per share. Revenue fell 14.7% to \$111.9 million. In 1984, CCI earned \$6.3 million, or 54 cents per share.

• **Miniscribe Corp.** The Longmont, Colo., hard disk drive maker finished an unprofitable 1985 on a positive note, posting a \$2.4 million, 7 cents per share, profit on a 27% revenue increase. Miniscribe's sales were \$35.6 million, compared with \$28.1 million a year earlier when the firm posted a loss of \$6.9 million, or 37 cents per share.

For the year, Miniscribe lost \$16.8 million, or 88 cents per share, compared with a loss of \$5.7 million, or 31 cents per share in 1984. The company's sales fell 7.8% to \$113.9 million.

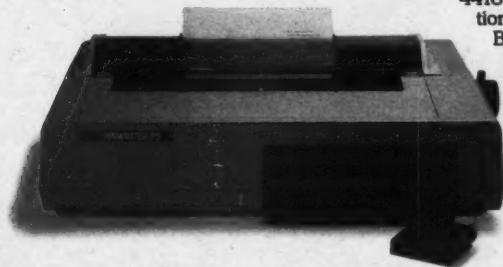
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## COMPUTER INDUSTRY

# Harris blames layoffs on federal cuts

By James A. Martin

MELBOURNE, Fla. — Citing cutbacks in the federal defense budget and delays in the funding and awarding of contracts, Harris Corp. recently announced that it will lay off between 100 and 150 employees in its government systems sector.

The layoffs will affect employees at the company's Palm Bay and Maitland, Fla., factories. The company said it hopes to relocate some of the workers to other Harris divisions.

The government systems sector is composed of eight divisions, including Aerospace Systems for the U.S. Department of Defense and the National Aeronautics and Space Administration, and employs 10,000 of Harris' 31,000 workers. The recent space shuttle *Challenger* catastrophe and subsequent postponement by NASA of future projects was not a reason for the cutbacks, according to James F. Murphy, manager of public relations for Harris.

In addition, semiconductor division employees have been ordered by the company to take five days of paid vacation before March 28. "The semiconductor industry is a depressed market right now, and we want to have maximum productivity when the market begins to pick up," Murphy said.

Sales in fiscal year 1985 for the government systems sector were \$789.6 million, a 25% increase over the \$630.4 million reported the previous fiscal year. In December, Harris merged its analog and digital products divisions and eliminated some 100 administrative positions.

## Harris merges two divisions

MELBOURNE, Fla. — Harris Corp. announced plans to combine its government satellite and government data communications divisions into one organization called the Government Communications Systems division.

Set up to streamline the company's government related business, the new division will focus on ground-based satellite communications networks and other data communications networks for tracking, telemetering, transmission and dissemination of information.

No product lines were discontinued with the merger, a spokesman said.

The division will be headed by Allan Beaupre, who had been vice-president and general manager of the government data communications division. Richard Farotto, who held the same title for the satellite communications division, was named vice-president of business development for the new division.



### SUPERSHORTS

**Tandon Corp.** has stated that more Japanese companies — Canon, Inc. and its subsidiaries and Copal Co. of Japan, a Fujitsu Ltd. affiliate — have been granted licenses under which they are allowed to manufacture microcomputer disk drives using Tandon's double-sided flexible disk-drive patent.

**LSI Logic Corp.** of Milpitas, Calif., has announced that it will open a custom and semicustom semiconductor design center in Scotland. The center is set to be operational this month.

**Pick Systems** of Irvine, Calif., has filed a Federal District Court suit against **VMARK Computer, Inc.** of Natick, Mass., charging copyright infringement, trade secret infringement and unfair competition. The suit claims, among other allegations, that proprietary software developed by Pick Systems was misappropriated.

**Convex Computer Corp.** has announced the establishment of its Convex KK operation in Tokyo. Convex KK will be a wholly owned subsidiary and will be operational in early 1986.

**Mead Data Central**, a wholly owned subsidiary of the **Mead Corp.**, has selected AT&T's nationwide Services Division to install and maintain more than 16,000 of the company's custom data terminals in areas not covered by Mead service technicians. The agreement represents AT&T's first stand-alone service contract to install and maintain non-AT&T equipment.

**MEK, Inc.** has sued the **Sulcus Computer Corp.**, alleging that products provided to MEK were substantially unsalable at the prices charged by Sulcus and therefore virtually worthless, causing MEK to lose in excess of \$335,000 while attempting to sell Sulcus' microcomputer systems.

**Continental Telecom, Inc.** has announced an agreement in principle to sell its subsidiary **National Bancard Corp.** (Nabanco) to the management of Nabanco, subject to regulatory approvals and approval by Continental Telecom's board of directors.

# Net/Alert has always widely-used network



Not so long ago, people called Net/Alert the Rolls-Royce of network performance monitors. They were right. Net/Alert was the most sophisticated, most widely respected system available — and the most expensive.

Yet knowledgeable network managers throughout the world chose Net/Alert. Because while the investment was big, the payback was bigger. And fast.

Now, thanks to our new technology, Net/Alert is even better. And more affordable.

### New hardware, software. Lower prices.

New microprocessor and firmware technology has reduced Net/Alert prices to a level that can be justified in almost any network — even small ones. The latest release offers all the features that made Net/Alert the best and most widely used performance monitor — but at about half the price of earlier versions.

Net/Alert does more, and does it better, than any other performance monitor.

## Now it's also the most affordable.

## COMPUTER INDUSTRY

**General Electric Co.** has signed an agreement with **Texas Arrays, Inc.** of Carrollton, Texas, under which Texas Arrays will act as a design center to support GE's gate array and standard cell customers.

**Chase Manhattan Bank** has formed a new subsidiary, **Chase Access Services Corp.** The offshoot will pursue the development, operation and support of wholesale electronic banking services. Headquartered in Waltham, Mass., the company was formerly the Treasury Management Services Division of Interactive Data Corp.

**Concord Data Systems, Inc.** has announced a multiyear agreement with **Digital Equipment Corp.** to develop General Motors Corp.'s Manufacturing Automation Protocol inter-

faces for DEC's Microvax computers.

**Software Publishing Corp.** of Mountain View, Calif., is expanding its operations in Europe with the opening of a London-based office. This will be the firm's first office located outside Mountain View.

**Data General Corp.** has entered into an agreement, subject to approval by the Federal Communications Commission, to purchase a minority interest in **Dama Telecommunications Corp.** in Parsippany, N.J. DG and Dama expect to form a joint venture to develop, manufacture and market new integrated telecommunications products and services for future business and office automation offerings.

## Automated Language Processing

**Systems of Provo, Utah, and IBM** have signed an agreement under which Automated Language Processing Systems will provide its Translation Support System language translation software to run on IBM computers. IBM intends to install the Translation Support System software to help translate product materials from English into eight or more European languages.

**Xerox Corp.** announced a new service program for its Business Systems Systems and other local-area network products. The program, called Xerox Service Solutions, provides service for systems hardware manufactured by Xerox and other major manufacturers.

**GSS** has announced that it has entered into an agreement with **IBM**

whereby IBM will market selected GSS video display interface-based products as IBM-logo software for the newly announced IBM RT Personal Computer engineering workstation family.

**Intergraph Corp.** announced plans to purchase **Optronics International, Inc.** of Chelmsford, Mass., a maker of optical scanning devices. Huntsville, Ala.-based Intergraph will continue to resell Optronics equipment with its computer graphics systems.

**Paladin Software Corp.** of Santa Clara, Calif., filed for protection under Chapter 11 of the Federal Bankruptcy Code, seeking protection from its creditors. The move was prompted by a suit from five creditors seeking \$91,000 in back debts from the firm. Paladin is the company that acquired **Visicorp**, maker of the Visicalc spreadsheet package.

**Altos Computer Systems, Inc.** announced plans to sell 26% of its share in **Wyse Technology, Inc.**, a terminal manufacturer based in San Jose, Calif. Altos said it expects pretax gains of \$30 million from the sale.

A Santa Monica, Calif., developer of low-end Unix-to-DOS file conversion programs, **Locus Computing Corp.**, has acquired a neighboring company, **Uniform**, that focuses on high-end Unix-DOS communications. Uniform, also of Santa Monica, will become a wholly owned subsidiary of Locus. Gerald Popek, Locus founder, will continue as president, and Charles Kline will continue as vice-president.

Both companies develop software to integrate data from Unix and DOS files and Unix host systems, enabling systems to run both DOS and Unix applications simultaneously.

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No other performance monitor can give such richly detailed facts. Some don't monitor applications or transactions at all.

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Net/Alert's easy-to-grasp color screens alert operators instantly to status and performance problems. You can see the network's service level at a glance. Overall. Or by application or transaction type. And you can zero in on groups of lines, individual lines, control units, and terminals.

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## More reports. More useful information.

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end-user availability, line utilization, and terminal utilization. All by application or transaction.

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Net/Alert's on-line database is under your control, independent of the host computer. It builds historical files for today, yesterday, this week, this month, this year. On boundary lines, trunk lines, transmission groups, control units, and devices.

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Most performance monitors are limited to leased-line networks. But Net/Alert can also handle dial-up and trunk networks. X.25. Speeds up to 64kb. Over 50 protocols. For IBM, Sperry, Comten, Burroughs, ICL, Honeywell, Digital, and others.

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# Daewoo to rescue troubled Zymos

SUNNYVALE, Calif. — Daewoo Corp., a South Korean manufacturing conglomerate, will eventually gain controlling interest in U.S. semiconductor manufacturer Zymos Corp. under a nonbinding letter of intent signed last week by those two firms and Intermedics, Inc., a maker of biomedical devices and 47% owner of Zymos.

Financially troubled Zymos reported a loss of \$2.7 million, or 17 cents per share, on sales of \$4 million for its fourth quarter ended Nov. 3. For the year, Zymos lost \$11 million, or 71 cents per share, on \$17.8 million in revenue.

Zymos said that its accountant, Touche Ross & Co., is expected to qualify its opinion of the firm's 1985 financial statements because of "uncertainty that Zymos will have adequate financial resources."

The fiscally strapped company has found a rich partner in Daewoo, one of several South Korean conglomerates whose activity in the U.S. computer industry has intensified dramatically in the past year. Daewoo manufactures the Model D IBM Personal Computer-compatible micro that is sold by Leading Edge Products, Inc.

## COMPUTER INDUSTRY



Wang Laboratories, Inc. has announced the completion of the Walsh, Greenwood Information Systems, Inc. acquisition.

The Walsh Greenwood firm will be operated by a new, wholly owned subsidiary, Wang Financial Information Services Corp. The new subsidiary will offer Shark, a market data retrieval analysis system.

NCA Corp. and Silvar-Lisco, based in Menlo Park,

Calif., have signed a letter of intent agreeing in principle to the acquisition of NCA's Design Automation Group by Silvar-Lisco.

On-Line Software International, Inc., has acquired Secure from Boole & Babbage of Sunnyvale, Calif. As a result, On-Line Software's Omniduard, a software security product to protect DOS/VSE, VM and CICS environments, will be enhanced to protect the MVS environment as well.

Svend Hartmann, president of Computer Merchants, Inc. of Chappaqua, N.Y., announced that the lease portfolio of Computers & Peripherals, Westwood, Mass., has been purchased for cash and notes. The portfolio, consisting mainly of IBM equipment, will be added to the existing lease portfolio of Computer Merchants.

TRW, Inc. has acquired Circle Computer Services, Inc., a Schaumburg, Ill.-based company that provides technical services to leasing companies and users of IBM computer equipment. Circle Computer Services will become part of TRW's Customer Service Division.

Novell, Inc. has announced the acquisition of Microsource Technologies, formerly an independent distributor organization for Novell's Netware products.

Vanguard Atlantic Properties, Inc., a Connecticut firm jointly owned by Dun & Bradstreet Corp. and Vanguard Atlantic Ltd., announced the sale of certain assets to Decision Technology, Inc. The sale involved the Data Analyzer and Audit Analyzer software product lines.

Ingram Software Distribution Services, Inc. of Buffalo, N.Y., and Softeam, Inc. of Compton, Calif., announced the intention of Ingram Distribution Group, Inc. of Nashville to purchase all of the common stock of Softeam.

Upon completion of the transaction, Ingram Software Distribution Services and Softeam will be combined, and the ongoing operation will be named Ingram Software, Inc. The new company will be a wholly owned subsidiary of the Ingram Distribution Group.

Canoga Data Systems, Inc. has consolidated with its parent company, Perkins Research and Manufacturing, to form Canoga-Perkins. Perkins Research and Manufacturing designs, manufactures and sells outside testing equipment to the telephone industry.

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### EXECUTIVE CORNER

Fred Cohen, chairman of the board of Telesciences, Inc., announced the election of Leopold P. Oberst as president and chief operation officer. Cohen will continue as Telesciences board chairman and chief executive officer and as president of Urix Corp., a wholly owned subsidiary of the company.

Donald R. Lundell has been named president and chief executive officer of Aspen Peripherals Corp. Before joining Aspen Peripherals, Lundell was president and

chief executive officer of Atasi Corp. Prior to joining Atasi, Lundell spent 18 years with IBM where he held numerous senior management positions.

David Sen-Lin Lee has been appointed president and chief executive officer of Data Technology Corp. Lee replaces David Tsang, who will remain with Data Technology as chairman of the board and executive vice-president. Prior to joining Data Technology, Lee was with ITT, where he was vice-president and group executive of ITT's Business Information Systems Group.

Raymond R. Maturi, president and chief operating officer of Systematics, Inc., has been named to the additional office of chief executive officer.

Neal C. Hanses has been elected chief executive officer of Applied Communications, Inc. Hanses has served as president and chief operating officer of Applied Communications since March 1985.

Vernon C. Jobson Jr. has been appointed group vice-president, communications systems, at Bell South Enterprises, Inc. Jobson most recently was president of Sony Information Products Co. He was also vice-president and general manager of Dictaphone Corp. and spent several years with IBM.

Interactive Data Corp. announced the appointment of Ed Gillott as vice-president for applications software development. Gillott, founder of Anidata, Inc., a developer and marketer of microcomputer software, created the Market Analyst, an investment analysis package used for technical charting.

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MAIDS transforms your screen into a three-dimensional relational Vector Space (vector = column/row) that obeys the built-in Mathematical commands such as:

sin, cos, tan, log10, log, sqrt, statistics, probability, random, number,

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MAIDS makes a reasoning person of you - an intelligent person must be able to think logically.

Are you reasonable?

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Logical reasoning? Yes, if you still remember how to apply the 14 basic rules of inference (laws of thoughts) in logical deductions.

MAIDS enables you to go beyond the current logic.

MAIDS will help you think logically.

MAIDS also makes you realize your thinking should not be confined to just one logic system - one set of fixed rules; you can create your own; MAIDS provides such tools to model and develop different logic systems.

MAIDS will increase your productivity in developing dBASE III database systems - dBASE Systems Generation.

In building a sophisticated database system, all you have to do is to define the database on the spreadsheet provided by MAIDS and MAIDS will do the rest for you - generates 14 database programs (dBASE III command files for menu-driven database update, review/print, formatted report, process modeling, mass update, ad hoc query, index management, system proc skeletons, etc.); They are sophisticated and yet can be customized to your needs; it takes about 4.5 minutes. MAIDS can do it while you're having coffee-break.

MAIDS protects you against the "fifth-generation" shock - Go from "Prolog" (programming in logic) to "Prothought" (programming in thoughts - sophisticated, easy, and fast).

MAIDS provides you with Prolog-type commands to work with first, so you can learn what Prolog is all about.

Prolog has been adopted for the Japanese "fifth-generation" computer. Like it or not, it will arrive. With MAIDS, you are not going to have a "fifth-generation" shock; MAIDS leads you to go beyond "Prolog"; your thinking comes before logic and should go beyond logic.

Our goal is to Program in Thoughts - not just program in logic. To go beyond Prolog to Prothought - it necessitates the following facilities in the new forms of a spreadsheet to develop:

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- THOUGHT-BASE (Knowledge-Based, Rule-Based) MANAGEMENT
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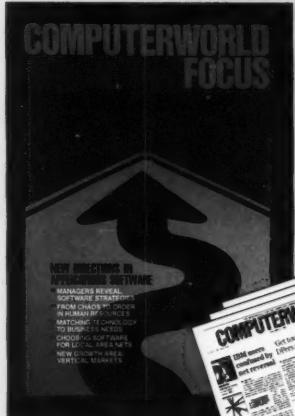
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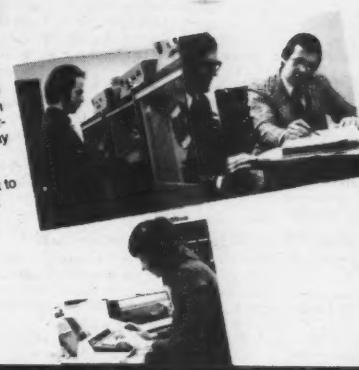
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<b>Business Systems Programming/Analysis</b> ■ Computer Production Control Analysts ■ Master Console Operators ■ Sr. Software Systems Analysts ■ Programmers/Analysts (IMS & IDMS)  Please send your resume to: Mary Adams	<b>SOFTWARE DEVELOPMENT ENGINEER</b> : Duties: design/dev. computer programs on DEC computers for use in credit card/sec. ID mfg machines, provide customer support, design user interface using Chinese. Quals: Bachelor in Comp. Sc. & Business able to speak/write Chinese in Mandarin & Cantonese, plus knowledge of DEC VAX 11/785 op. sys. 40 hrs/wk. \$25,900/yr. Letter w/ resume to Mr. Hewitson, 6-14, Job Service, 309 2nd Ave. So., Minneapolis, MN 55401.	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>
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<b>Relocation assistance is available.</b>  Northrop provides our employees a competitive, comprehensive benefits package. Please send your resume to the appropriate contact person at: Northrop Advanced Systems Division, Employment Office, Dept. CW 2501, P.O. Box 1138, Pico Rivera, CA 90660-9977.  <b>PROOF OF U.S. CITIZENSHIP REQUIRED.</b> Northrop is an Equal Opportunity Employer M/F/H/V.	<b>DATA PROCESSING MGR OR SENIOR ANALYST</b>  Agricultural company in Southern Kentucky requires computer professionals with minimum 5 years DP experience. Must be proficient with DEC VAX, BASIC and COBOL. Well-developed interpersonal and communications skills a must. Excellent opportunity for a qualified computer professional who can assume total responsibility for design and programming in a small shop environment.  Send resume and salary requirements to: DALGETY, INC. P.O. Box 5919 San Marcos, CA 93042 Attn: Data Processing EOE M/F	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>
<b>PROJECT MANAGER</b> <b>Administrative Data Processing</b>  Dartmouth College, a small Liberal Arts college in picturesque Hanover, New Hampshire, has a key position open for a Project Manager in Administrative Data Processing.  The Project Manager's responsibilities include: systems' analysis of administrative functions of the college and design, specification, and supervision of the development of in-house software. When appropriate, the manager recommends the purchase of software and manages its installation, modification, and maintenance.  In addition, the manager trains users in the use of new systems as well as existing systems and provides user, operator, and systems documentation for systems installed. The manager delegates computer program development tasks to others, providing clear guidance but leaving freedom to meet the specifications using their own judgment and skills.  Requirements include the following experience or equivalent: a college degree, preferably in computer science; six years' experience in computer systems' administration, supervision, systems analysis and/or project management; and the ability to work well with senior managers such as Deans and Vice Presidents, as well as working-level personnel.  Review of resumes will begin March 17, 1986. Please send resume to Dartmouth College, Personnel Administration, Clement Hall, Hanover, New Hampshire 03755.  Dartmouth College is an equal opportunity employer with an affirmative action plan.	<b>PROJECT MANAGER</b>  Lead projects in the design of microcomputer applications related to healthcare industry. Responsible for development of system software using Intel 80186 and 80286 based processors as well as Z80, Z8000, PL/I and Intel assembler languages. Involved in convergent technologies such as AIMS, IVMS, NEW VGEN, MICROFRAME and MINIFRAME. Openings are for computer professionals consisting of system design analysts and system design engineers. 40 Hour week, 8-5, \$32,500/yr. Benefits depend on experience. Send resume with 3 years of experience or 3 years programmer/analyst. Resume to: J. Hitzheim, Tennessee Job Service, 1295 Poplar, Memphis Tennessee 38104.	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>
<b>Systems Auditor.</b> Provides data processing support of the company's internal audit function, including supervision of new and existing data processing systems.  37.92 hours per week, 8:00 a.m. to 4:30 p.m. Twenty-three Thousand Eight Hundred Fifty Dollars per annum. Requires 4 years Bachelor's degree with major in computer science or management information systems. (If major is in computer science, must have a 3.0 average minor.) Applicant will have one year's experience in systems auditing or a master's degree in management information systems. Send resume with Social Security number to Indiana State Employment Service, 10 North Senate Avenue, Indianapolis, Indiana. Attention: W.F. Shepherd, I.D. Number 3027757.	<b>EDP AUDIT PROFESSIONAL</b>  We currently have a highly visible position for an internal auditing professional to manage our EDP audit function. This individual will manage a group of five professional EDP Auditors and be responsible for developing, administering and supervising EDP audit coverage for all EDP activities.  This position requires a bachelor's degree in computer science, accounting or business administration. Applicants should have at least six years of experience related to auditing computerized data systems. Excellent oral and written communication skills are required. Proven management abilities and professional certifications are desirable. Familiarity with the following is highly desirable: IDMS in an MVS/IBM environment, mainframe operating systems, TSO/SPF, CICS, ACF2, SMF, FORTRAN, COBOL, STRADIS, Easytrieve, Panudit and microcomputers.  San Diego Gas & Electric has annual operating revenues of \$1.7 billion and serves more than 893,000 customers. We offer a competitive compensation and benefits package, relocation assistance and the outstanding climate of San Diego.  Please send resume and salary history to: EMPLOYMENT OFFICE DEPT. 452	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>
<b>San Diego Gas &amp; Electric</b> P.O. Box 1831 San Diego, CA 92112  Affirmative Action/Equal Opportunity Employer	<b>Get your money's worth. Computerworld will lower your cost-per-hire.</b>  When you're looking to fill MIS/DP positions, there's really only one place you need to advertise. Computerworld.  In every major market, Computerworld reaches more data-processing professionals than the local recruitment media. And we reach them for less.  Over 600,000 computer-involved professionals receive Computerworld every week. That's more than any other computer trade journal, business publication, or general-interest magazine.  Computerworld delivers quality readership, too. Fully 41% of our subscribers read Computerworld's recruitment section every week. And 95% of our subscribers read this section regularly.  That's why over 4,000 organizations ran more than 6,500 recruitment ads in Computerworld in 1984. The openings they advertised for cover the whole gamut of MIS/DP positions -- including systems analysts, computer science & software engineers, directors of MIS/DP, programmers, sales managers, and systems managers.  As a matter of fact, recruitment advertising has made Computerworld the national leader in classified advertising among specialized business publications (according to <i>Business Marketing</i> magazine).  Compare costs and the people reached. You'll find that Computerworld is the number one medium for computer-related recruitment advertising.	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>	<b>POSITION ANNOUNCEMENTS</b>
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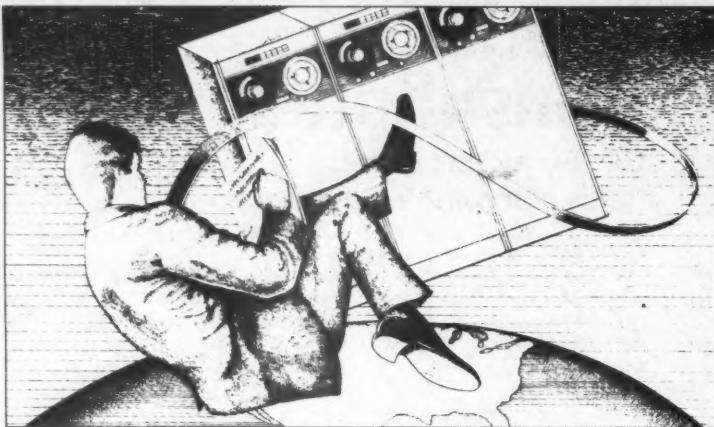
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Pacific Northwest Laboratories

S/38

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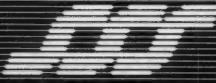
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### Executive Reports

- Mar 17 - Managing Voice & Data Communications
- Mar 24 - Personal Computer Networks
- Apr 28 - Software Maintenance
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- Mar 10 - 32-bit Workstations
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## COMPUTER INDUSTRY

## Wary optimism in Phoenix

From page 126

from the past year than IBM did. "Few of us get the opportunity to reassess everything we believe in as a company," Apple Computer, Inc. Chairman John Sculley remarked.

With that reassessment now complete, Apple will accentuate its position as an alternative-technology company, Sculley said. But "go-it-alone innovation, which Apple had been part of in the past, is doomed," he added.

Positioning the Macintosh as a general-purpose workstation, Apple said it intends to move further into graphics, desktop publishing, image processing and artificial intelligence. Sculley also emphasized plans to build many links to other systems, one being Digital Equipment Corp.'s All-In-One office system.

Among attendees, suppliers outnumbered users by roughly 100:1. But the forum did highlight several issues where there is no general working consensus among buyers and sellers — most spectacularly, software licensing options for large corporations.

### 'Prices have got to come down'

"Software prices have got to come down," declared Danielle Barr, vice-president for corporate systems at the Bank of New England. "Corporate America has been held hostage."

Barr explained that she was particularly concerned about upgrade and control provisions, whose impon-

tance has grown as personal computers have become essential for some jobs. "The cute little stand-alone personal computer is going away."

"My sales are going up, and I'm not going to site-license," Ashton-Tate President Edward Esber replied.

Similar disagreements cropped up on overall pricing trends. Both Ashton-Tate and Borland International recently raised their prices to the distribution channels, but Borland President Philippe Kahn noted that overall pricing may be headed down. "Pricing is a nonsolvable issue; we could talk for a year," he summed up.

On the technology front, many software developers at the forum expressed concern about the need to write several IBM-compatible versions of a program, as the standard IBM Personal Computer slowly is replaced by more powerful successors. "Isn't the IBM standard just about to fragment into several areas?" asked Robert Carr, Ashton-Tate's chief technologist. "Are we ending a golden era?"

No computer conference would be complete without a discussion of upcoming artificial intelligence products, but AI product claims provoked a healthy amount of skepticism. "AI will affect the personal computer market like a virus, not like a military campaign," predicted Jerrold Kaplan, Lotus Development Corp.'s principal technologist.

Lotus Chairman Mitchell Kapton cautioned against confusing interest with sales. "There have been huge interest levels in integrated software," he pointed out. However, he said, "Where is the evidence that there are a million or two users who want to write their own expert systems?"

## IBM cracks down on gray market, nixes Atlanta dealer authorization

By Douglas Barney

Last week's termination of an Atlanta microcomputer retail chain as an authorized IBM dealer has served notice that IBM is serious about its crackdown on the so-called gray market of unauthorized resellers.

The chain, 21-store Micro Mart, admits it sold products to the gray market, but the firm pointed to IBM as the root of the problem. "Through its discounting schedules, IBM encourages us to buy a lot of products, then doesn't give us any way of adjusting inventory because there is increasing price pressure in the market," said John Day, a spokesman for Micro Mart.

IBM will maintain its pressure on the gray market through enforcement of dealer contracts and the firm's nationwide newspaper advertisement campaign warning consumers that buying from unauthorized sources will void IBM's warranty. "We consider the ad campaign another step in an ongoing gray market enforcement program. We have consistently maintained what we consider to be a vigorous gray market enforcement program," said Rob Wilson, an IBM spokesman.

### Losing warranty service

Users, however, have little to fear other than losing warranty service. IBM will service products bought from unauthorized sources but not

under warranty, Wilson said.

Besides terminating contracts with its dealers and value-added dealers, IBM has canceled volume purchase agreements with some direct customers who sold their Personal Computers into the gray market. IBM declined to identify direct customers whose contracts had been terminated.

Some dealers say they believe it is too early to tell whether IBM's renewed effort will be effective. Others say they believe that IBM has already been successful in stemming gray market activity.

### The fear of IBM'

"I think the fear of IBM is definitely reaching into the marketplace. They are never going to be able to totally curtail the gray market, but volumes in the gray market are diminishing," said Richard Mathis, president of the Computer Shoppe, Inc., a dealer based in Nashville.

Authorized dealers further claim that the gray market hurts those dealers offering high levels of service and support because they cannot compete with the discount pricing of gray marketeers who, dealers claim, offer little support.

But many, such as Day, argue that if IBM completely eliminated the gray market, many authorized dealers would lose an important safety valve for excess inventory.

## Wall Street eyes Convergent for longer term investments



### ACTIVE ISSUES

Kathy Porteus

**A**lthough short-term investing prevails on Wall Street, longer term investment opportunities still surface. One stock that many analysts expect to perform well in the 12- to 24-month time frame is Convergent Technologies, Inc. (CVGT — 114).

Assuming the computer industry significantly improves in the second half of 1986, most analysts say they believe Convergent's stock, toward the end of this year, should reflect stronger orders and anticipate substantially increased earnings in 1987.

James Magid, a securities analyst with L. F. Rothschild, Unterberg Towbin, says he believes Convergent is "within six months of when the breakout of its growth should be reestablished, based on new OEM customers and new products for existing OEMs."

Convergent has yet to announce the products that analysts say should begin benefiting sales by year end. These offerings include a Unix-based workstation; a product that extends the performance of Convergent's Ngen workstations; IBM Personal Computer-compatibility features for Ngen; and a workstation for AT&T. Convergent's largest OEM customer.

Convergent recently announced an agreement with David Systems, Inc. of Sunnyvale, Calif., whereby Convergent's workstations, via a David Systems device, can interconnect at transmission rates of 2M bit/sec. using standard telephone wiring (see story page 102). According to Magid, the agreement gives Con-

*Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.*

## Earnings slip at HP, Cullinet

From page 126

pendent data base management system market because IBM's DB2 is slowing or winning decisions," according to Alex Brown & Sons analyst Chris Mortonson. "On the applications side, Cullinet's business is tied to the manufacturing sector, the part of the U.S. economy that seems to be hurting the most. There is no easy way for Cullinet to get healthy; they have to gradually sell their way out and keep tight controls over expenses."

Cullinet earned \$3.8 million, or 13 cents per share, in the quarter, compared with \$6.3 million, or 21 cents

per share, a year earlier. For the first nine months of its fiscal year ending April 30, the Westwood, Mass., software vendor lagged behind its comparable fiscal 1985 revenue by 1%, and profits were down 34%.

HP President and Chief Executive Officer John Young said the Palo Alto, Calif., minicomputer and scientific equipment firm has reduced its work force by 1,000 employees through attrition in the last two quarters.

Although its overseas sales have

benefited from the weaker U.S. dollar, HP continues to feel the effects of its older product line worldwide. Jean W. Orr, a vice-president with Drexel Burnham Lambert, Inc., estimates Convergent will earn 75 cents a share in 1986 and \$1.10 per share in 1987, with both years reflecting a "modest positive" effect from the merger. However, William Easterbrook, partner and vice-president at Kidder, Peabody & Co.'s San Francisco office, says the merger with 3Com "will dilute Convergent's 1986 earnings by about 10 cents a share."

Underlying such areas of disagreement is the consensus among analysts that Convergent represents a good value for the longer term investment. Clouding Convergent's short-term (three- to six-month) outlook are continued flat or lower revenue levels and pressured margins.

According to Thomas Rooney, a computer analyst with Donaldson Lufkin & Jenrette, Convergent's quarterly revenue must increase by more than \$10 million for the company to resume buying its parts in volume, thereby reducing its manufacturing costs. "But the first half of 1986 is looking weaker than I had expected," Rooney observes.

"Convergent's stock may even tick back to 10," Leung of Smith Barney says. "No matter how you cut it, the company cannot improve profitability without new sales."

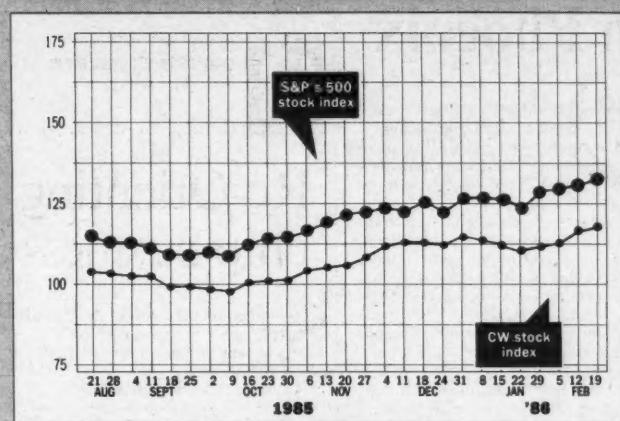
L. F. Rothschild's Magid is more bullish. Citing Convergent's earnings gains in 1985, which were attributed more to cost cutting than to revenue, Magid says he "expects the company's margins will still increase on flat sales."

Overall, HP posted sales of \$1.6 billion in the first fiscal quarter, compared with \$1.53 billion a year earlier. Earnings fell from \$116 million, or 45 cents per share, a year ago to \$109 million, or 43 cents per share.

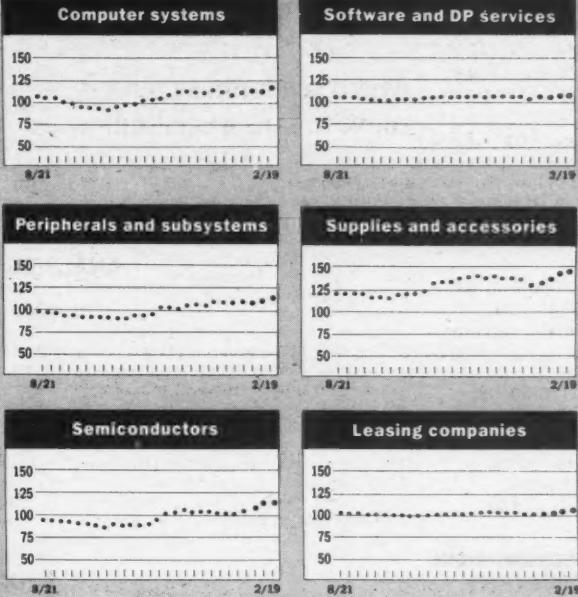
## COMPUTER INDUSTRY

MITCHELL J. HAYES

## Computerworld stock trading index



All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.



	2/12/86	2/19/86
Computer systems	114.7	119.1
Software and DP services	104.3	104.4
Peripherals and subsystems	108.2	112.2
Supplies and accessories	144.0	148.1
Semiconductors	110.5	110.8
Leasing companies	103.1	103.0
CW stock index	114.7	118.8
Standard and Poor's 500 stock index	129.1	131.0

## Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, FEBRUARY 19, 1986

	52-WEEK RANGE (1)	PRICE CLOSE FEB 19 1986	WEEK NET CHG	WEEK PCT CHG		52-WEEK RANGE (1)	PRICE CLOSE FEB 19 1986	WEEK NET CHG	WEEK PCT CHG		52-WEEK RANGE (1)	PRICE CLOSE FEB 19 1986	WEEK NET CHG	WEEK PCT CHG	
<b>COMPUTER SYSTEMS</b>															
O ALPHAMICROSYSTEMS	5- 9	6	-1/4	-4.0	O ADVANCED COMP TECH	2- 5	5	+5/8	+14.2	P AM INTERNATIONAL	3- 7	7	1/8	+5/8	+9.6
O ALTO COMPUTER SYST	9- 16	15	3/4	+7/8	O ADVANCED SYSTEMS INC	9- 19	19	1/8	+4.7	A ANDERSON JACOBSON	2- 7	2	1/8	+1/8	+6.2
A AMDAHL CORP	10- 18	16	1/8	+1 1/4	O AGS COMPUTERS INC	10- 25	25	+1 5/8	+6.9	O AST RESEARCH INC	7- 33	25	5/8	+5/8	-2.3
O ANDONI COMPUTER	9- 31	15	+1 3/4	+11.4	O AMERICAN SOFTWARE	9- 15	15	-1/8	-1.0	O AUTO-DATA TECHNOLOGY	3- 13	4	3/8	+1/4	+0.0
O AT&T	14- 31	25	+1/4	-1.1	O ANALYSTS INT'L CORP	2- 4	4	5/8	0	O AVANTAGE COMPUTING	3- 21	5	1/4	-1/4	-2.9
N BURROUGHS CORP	19- 28	21	1/4	-1/8	O ASHTON TATE	5- 11	23	1/2	-2.7	O BANCTEC INC	6- 12	8	1/4	-1/4	-2.9
O COMPUTER AUTOMATION	52- 71	70	7/8	+3 5/8	O AUTOMATION SYSTEMS	7- 25	25	+5/8	-2.7	O BEEHIVE INT'L	1- 2	1	1/8	-1/8	-50.0
O COMPUTER AUTOMATION CP	5- 14	13	+1/4	+3/8	O AUTOMATRONIC PROG IND	3- 2	2	3/8	+2.0	N BURR-BERANKE & NEW	20- 37	37	1/8	+1 1/8	+3.1
A COMPUTER CONSOLES	1- 9	9	+1/4	-1/4	O AUTOMATIC DATA PROC	35- 66	66	+1 1/8	+2.9	O CAMPBELL INSTRUMENTS	3- 11	1	3/8	+1/4	+0.0
N CONTROL DATA CORP	15- 39	23	1/4	+5/8	O AUTOMATRONIC DATA COMP	5- 9	5	3/4	+1/2	O CEDEC CORP	6- 9	7	3/4	-1/8	-1.6
O CONVERGENT TECHNOL	5- 13	7	1/8	+5/8	O AUTOMATRONICS	18- 37	37	+1 1/8	+2.9	O CELESTRON CORP	4- 11	3	3/8	+3/4	+0.0
O CPT CORP	5- 8	6	+1/4	-1/4	O AUTOMATRONICS	10- 34	34	+3/8	+3.6	O COMPUTER TRANSCEIVER	22- 36	25	5/8	+3/4	+2.2
N CRAY RESEARCH INC	25- 71	68	3/4	+5 5/8	O AUTOMATRONICS	13- 34	32	1/4	-5/8	O COMPUTERVISION CORP	9- 44	14	7/8	+2	+15.5
O DAISY SYSTEMS CORP	17- 38	17	1/4	-2 1/2	O AUTOMATRONICS	10- 25	24	3/4	+3/4	O COMPUTRONICS	12- 18	17	3/4	+3/4	+2.1
N DATA GENERAL CORP	31- 76	45	3/8	+3/8	O AUTOMATRONICS	1- 3	1	5/8	-1/8	O DATAPACIFICS CORP	11- 20	18	5/8	+1/4	+1.5
N DATARAVEN CORP	5- 22	10	+1/4	-1/4	O AUTOMATRONICS	1- 6	3	1/2	-1/2	O DATARAM CORP	4- 11	11	1/4	+5/8	+5.8
N DIGITAL EQUIPMENT	85- 160	160	1/4	+1 3/4	O AUTOMATRONICS	7- 12	10	1/2	+1/2	O DATA SWITCH CORP	4- 9	5	1/8	-7/8	-14.5
A EECO INC	13- 16	14	1/8	-1/8	O AUTOMATRONICS	13- 33	16	1/4	+2	O DATUM INC	5- 9	5	3/8	+1/4	+2.3
N ELECTRONIC ASSOC	3- 6	4	3/8	0	O AUTOMATRONICS	18- 37	37	+3/8	+9.8	O DATA/COMPUT	10- 20	11	1/4	+1/4	+2.1
N FEDERAL COMPUTER SYST	18- 37	22	2/3	-7/8	O AUTOMATRONICS	19- 37	37	+3/8	+9.8	O ENDATA, INC.	4- 8	5	1/8	+5/8	+13.8
N FOXBORO	22- 31	24	5/8	-7/8	O AUTOMATRONICS	4- 12	12	+1 1/8	+2.7	O EVANS & SUTHERLAND	12- 23	22	1/2	+1/2	+4.0
N GOULD INC	20- 38	28	1/8	-2	O AUTOMATRONICS	6- 12	75	+1 1/8	+2.7	O GANDALF TECHNOLOGIES	5- 13	6	5/8	+1/8	+1.9
N HARRIS CORP	22- 35	29	7/8	+3/8	O AUTOMATRONICS	20- 47	47	-2	-4.7	O HAZELTINE CORP	2- 11	11	1/8	-7/8	-1.8
N HONEYWELL INC	23- 42	34	3/8	+1/2	O AUTOMATRONICS	36- 60	49	1/4	-1/2	O HONEYWELL	20- 30	30	1/4	+3/4	+3.4
N IBM	117- 158	157	1/2	+2 1/2	O AUTOMATRONICS	13- 24	18	+3/4	+4.3	O ICOT CORP	10- 17	13	1/4	+1 1/4	+8.6
O IPL SYSTEMS INC	1- 4	1	5/8	-1/8	O AUTOMATRONICS	10- 20	20	1/2	-1/2	O LUNDY ELECTRONICS	10- 11	14	1/8	+3/8	+2.5
N ITT CORP	20- 32	24	1/4	-1/4	O AUTOMATRONICS	25- 34	34	-2	-2	O MEGADATA CORP	3- 8	3	1/2	-1/4	-6.6
N M/A-COM INC	13- 24	15	1/4	+5/8	O AUTOMATRONICS	15- 34	24	+1/2	+11.4	O MSI DATA CORP	7- 13	10	1/2	-1/4	-2.3
N MANAGEMENT ASSIST	2- 28	2	1/8	0	O AUTOMATRONICS	7- 13	12	7/8	-1/8	O NETWORK SYSTEMS CORP	14- 27	13	5/8	+1/2	+3.5
N MATSUSHITA ELECTR	49- 71	66	-1/4	-5.5	O MINGIT SCI AMER INC	7- 16	13	3/4	+1/8	N AMERICAN PHILIPS	32- 45	42	4/2	+1 3/8	+3.3
N MICROGRAPHICS INC	13- 30	19	+1/4	+5/8	O MINGIT SCI AMER INC	10- 23	23	1/2	-1/2	O NORTHERN TELECOM LTD	26- 41	27	5/8	-1/8	-0.4
N MODULAR COMPUTER SYS	6- 8	8	1/2	0	O MINGIT SCI AMER INC	13- 26	24	1/4	+1/8	O PARADYNE CORP	1- 18	3	1/2	0	0.0
N MOHAWK DATA SCI	1- 13	2	1/8	-1/8	O MINGIT SCI AMER INC	16- 35	35	1/2	-1/2	A PENRIL CORP	7- 14	8	1/2	+3/8	+4.6
N NEBS INC	11- 20	12	3/8	+1	O MINGIT SCI AMER INC	18- 37	37	1/2	-1/2	N PLESSEY CORP (ADR)	19- 29	29	1/2	+3 1/4	+12.5
N NCR CORP	25- 46	45	5/8	+1/8	O MINGIT SCI AMER INC	2- 4	2	0	0	O PRENTICE-HALL INC	9- 18	12	1/2	-1/4	-1.9
N NCR SYSTEMS INC	10- 27	27	1/4	+3/4	O MINGIT SCI AMER INC	8- 19	18	7/8	+1/2	O QMS INC	6- 10	10	1/2	-1/2	-1.0
N NCR SYSTEMS INC	13- 22	20	1/4	+2/3	O MINGIT SCI AMER INC	14- 29	29	5/8	+0.4	O RAMTEK CORP	2- 7	3	1/2	+1/4	+7.6
N NCR SYSTEMS INC	15- 27	26	5/8	-3/8	O MINGIT SCI AMER INC	15- 29	29	1/2	-1/2	N RECOGNITION EQUIP	9- 17	13	1/8	-1/8	-7.8
N PRIME COMPUTER INC	30- 59	52	1/2	+1 1/2	O MINGIT SCI AMER INC	17- 35	35	1/2	-1/2	N SCAN-TRON CORP	30- 44	37	1/2	+1/2	+3.1
N PRIMATRONICS INC	9- 25	18	1/8	-2 5/8	O MINGIT SCI AMER INC	17- 35	35	1/2	-1/2	N SCIENTIFIC ATLANTA	10- 15	13	1/8	+3/8	+2.9
N TANDEM COMPUTERS INC	13- 29	23	3/8	+4/4	O MINGIT SCI AMER INC	17- 35	35	1/2	-1/2	N SEAGATE TECHNOLOGY	5- 9	9	3/8	0	0.0
N TANDY CORP	24- 42	40	1/4	+3/4	O MINGIT SCI AMER INC	21- 36	56	1/2	-1/2	N SYSTEMS DYNAMICS	1- 4	3	1/2	+1/8	+3.3
N TELEVIDEO SYSTEMS	2- 4	3	5/8	0	O MINGIT SCI AMER INC	21- 36	56	1/2	-1/2	A T-BAR INC	5- 9	5	1/4	-3/8	-6.6
N TEXAS INSTRUMENTS	10- 27	27	1/4	+3 1/4	O MINGIT SCI AMER INC	21- 36	56	1/2	-1/2	O TAB PRODUCTS CO	14- 21	20	5/8	+1 1/8	+5.7
N ULTIMATE CORP	13- 22	12	3/4	0	O MINGIT SCI AMER INC	21- 36	56	1/2	-1/2	O TEC INC	3- 9	5	1/4	-1/4	+4.3
N VECTOR GRAPHICS INC	1- 1	1	1/8	0	O MINGIT SCI AMER INC	21- 36	56	1/2	-1/2	N TECNIX INC	47- 68	63	3/4	+1/8	+0.1
N WANG LABS INC	15- 29	19	5/8	+3/8	O MINGIT SCI AMER INC	21- 36	56	1/2	-1/2	N TELEX	34- 65	65	1/4	+2 1/8	+3.3
N XEROX CORP	37- 68	67	3/4	+2	O MINGIT SCI AMER INC	21- 36	56	1/2	-1/2	N TIMEPLEX INC	1- 20	15	7/8	0	0.0
<b>SUPPLIES &amp; ACCESSORIES</b>															
N AMERICAN BUS PRODS	21- 35	32	3/8	-5/8	N ADVANCED MICRO DEV	22- 36	31	3/4	0	N TITAN CORP	10- 29	27	7/8	+7/8	+3.2
N BARRY WRIGHT	17- 29	21	+1 1/8	+13.5	N ADV'D SEMICONDUCTOR	7- 13	11	1/2	+1/4	N TECNIX INC	5- 17	16	1/2	-1/2	-0.7
N CAMPULUS PRODUCTS INC	13- 22	14	1/4	+3/8	N ANALOG DEVICES INC	18- 31	30	1/2	+3/4	N TIMEPLEX INC	1- 20	11	1/8	-1/8	-0.8
N ENCLAVE FORMS	14- 26	20	1/4	+4/4	N ANALOGIC CORP	11- 18	14	5/8	-1/8	N TECNIX INC	10- 29	27	7/8	0	0.0
N 3M COMPANY	74- 98	98	1/4	+2 3/8	N ANALOG MAGNETICS CP	9- 17	17	1/2	+3/8	N TIMEPLEX INC	1- 20	15	7/8	0	0.0
N MOORE CORP LTD	15- 22	22	1/4	+3/4	N ANALYSTS INT'L CORP	18- 26	19	1/2	+1/4	N TECNIX INC	4- 11	11	1/8	-1/8	-1.1
N STANDARD REGISTER	22- 39	36	1/2	-2	N INTEL CORP	21- 33	26	1/4	-1/2	N U.S. LEASING	32- 43	37	3/4	-1 1/2	-3.8
N WALLACE COMP SERVICE	30- 45	44	1/4	-3/4	N MOTOROLA INC	26- 45	44	1/4	-1/8						
<b>SEMICONDUCTORS</b>															
N AMERICAN BUS PRODS	21- 35	32	3/8	-5/8	N NAT'L SEMICONDUCTOR	10- 15	14	1/4	+1/8						
N BARRY WRIGHT	17- 29	21	+1 1/8	+13.5	N NAT'L SEMICONDUCTOR	17- 33	26	1/4	-3/8						
N CAMPULUS PRODUCTS INC	13- 22	14	1/4	+3/8	N PANASONIC CORP	1- 12	12	1/2	-1/2						
N ENCLAVE FORMS	14- 26	20	1/4	+4/4	N PANASONIC CORP	1- 12	12	1/2	-1/2						
N 3M COMPANY	74- 98	98	1/4	+2 3/8	N PANASONIC CORP	1- 12	12	1/2	-1/2						
N MOORE CORP LTD	15- 22	22	1/4	+3/4	N PANASONIC CORP	1- 12	12	1/2	-1/2						
N STANDARD REGISTER	22- 39	36	1/2	-2	N PANASONIC CORP	1- 12	12	1/2	-1/2						
N WALLACE COMP SERVICE	30- 45	44	1/4	-3/4	N PANASONIC CORP	1- 12	12	1/2	-1/2						
<b>PERIPHERALS &amp; SUBSYSTEMS</b>															
N AMERICAN BUS PRODS	21- 35	32	3/8	-5/8	N PERIPHERALS & SUBSYSTEMS	1- 12	12	1/2	-1/2						
N BARRY WRIGHT	17- 29	21	+1 1/8	+13.5	N PERIPHERALS & SUBSYSTEMS	1- 12	12	1/2	-1/2						
N CAMPULUS PRODUCTS INC	13- 22	14	1/4	+3/8	N PERIPHERALS & SUBSYSTEMS	1- 12	12	1/2	-1/2						
N ENCLAVE FORMS	14- 26	20	1/4	+4/4	N PERIPHERALS & SUBSYSTEMS	1- 12	12	1/2	-1/2						
N 3M COMPANY	74- 98	98	1/4	+2 3/8	N PERIPHERALS & SUBSYSTEMS	1- 12	12	1/2	-1/2						
N MOORE CORP LTD	15- 22	22	1/4	+3/4	N PERIPHERALS & SUBSYSTEMS	1- 12	12	1/2	-1/2						
N STANDARD REGISTER	22- 39	36	1/2												

# COMPUTER INDUSTRY

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## INSTANT ANALYSIS

"Cullinet's 28 straight quarters of growth were often like a duck swimming on the water. He appears placid, but below the surface, he's paddling like hell."

— Kenneth J. Burke, software and services analyst, Alex Brown & Sons

## Wary optimism in Phoenix

Micro vendor meet reflects move toward specialization

By Eric Bender

PHOENIX — The 1986 Personal Computer Forum, the latest annual gathering of industry pioneers, was an odd mix of business conference, high-tech Tupperware party, support group and colleague reunion.

Top executives, clad in corduroy, casually chatted at poolside, nodding as their compatriots went by. The atmosphere was relaxed — maybe too relaxed, according to one company president, who told *Computerworld* that the forum often produces informal and promising-sounding deals, "but then when you get back to the office, you find your staff is up in arms about them."

This year's session, which drew more than 400 participants to a posh Phoenix

resort in the heart of the Sunbelt, reflected a general mood of cautious optimism. It also demonstrated how quickly the business is fragmenting into specialized markets, some of which have very little to do with "personal" computing.

Despite all the reports about a micro industry slump, "1985 did show good, steady growth," said Robert Carberry, vice-president for program development and operations at IBM's Entry Systems Division, in a kickoff speech. "There's a very positive, very stable period of growth in front of us."

Emphasizing IBM's continued belief in "the principles that got us where we are" in personal computers, Carberry also underlined the importance of ongoing work in system software and connectivity products that will support future moves into cooperative processing.

Some other players carried more scars

See **WARY** page 124

## ANALYSIS

## Earnings slip at HP, Cullinet

By Clinton Wilder

Hewlett-Packard Co. and Cullinet Software, Inc. both turned in disappointing financial reports last week, serving notice that the computer industry rebound remains at best an inconsistent, company-to-company phenomenon.

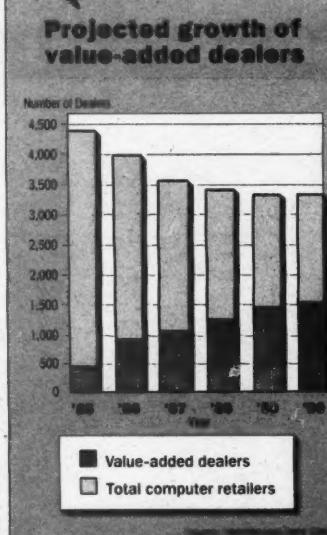
For the quarter ended Jan. 31, HP reported a 6% drop in profits on a 4% revenue gain. Even with tomorrow's long-awaited unveiling of the first of HP's Spectrum products, the company predicted only a modest improvement in its fiscal health in 1986.

Cullinet, after 28 consecutive quarters of sequential profit growth, reported its third straight quarterly drop in operating income. Although overall profits were up 1 cent per share from the preceding quarter, they were down 38% from the year-earlier period. Year-to-year sales fell 6% to \$44.6 million, and analysts foresee little improvement for Cullinet in the short term.

"No one is doing really well in the inde-

See **EARNINGS** page 124

## DATA VIEW



MICHELE HAYES

McEnaney is a Computerworld senior writer covering the computer industry.

## Novell approach: Low-profile success in the local net arena

By Douglas Barney

OREM, Utah — The foot of the Wasatch Mountains, just south of Salt Lake City, is an unlikely location for a major local-area network software vendor. But that is exactly where Novell, Inc. began its rise toward the top of the local-area network heap.

Although Orem is far removed from the high-technology mainstream, making it difficult to catch the attention of the financial community and the press, Novell is content to remain in Utah, where it has been since its inception in January 1983.

"We haven't had a lot of coverage, but we have done quite well anyhow. We kind of like it that way because

people call up and say, 'Where have you been for two years?' and we tell them that, if you look around, we are all over the place," says Raymond J. Noorda, president and chief executive officer of Novell.

Noorda may be right. Novell now has more than 30,000 installations, the firm says, and Novell products are even being sold by IBM's direct sales force.

Novell's local-area network software-based technology, along with the growth of the local network market itself, has

fueled a threefold sales growth from \$10.8 million in 1984 to \$33.6 million last year. And Novell has gone from 20 employees in 1983 to nearly 300 employees today.

Novell products are considered high performance in large part due to the firm's file server approach. Three years ago, Novell saw the advantage of a file-server-based system and withstood the critics who preferred disk-based systems. Then, in 1984, when IBM announced that its PC Network local-area net system was file

server based, Novell was proven right.

But even more crucial to Novell's success is the design of networking software that works with a variety of local-area network hardware. "At that time, it was very difficult to identify whether Ethernet or Arcnet or Omniprot or 'Whatever' was going to be the dominant factor because IBM had really not put their best net forward yet," Noorda says. Novell set out to design hardware-independent software, and now Novell's Netware runs on more than 30 local-area networks.

Novell has become somewhat of a pioneer by offering fault-tolerant See **NOVELL** page 101



Novell, Inc. President  
Raymond J. Noorda

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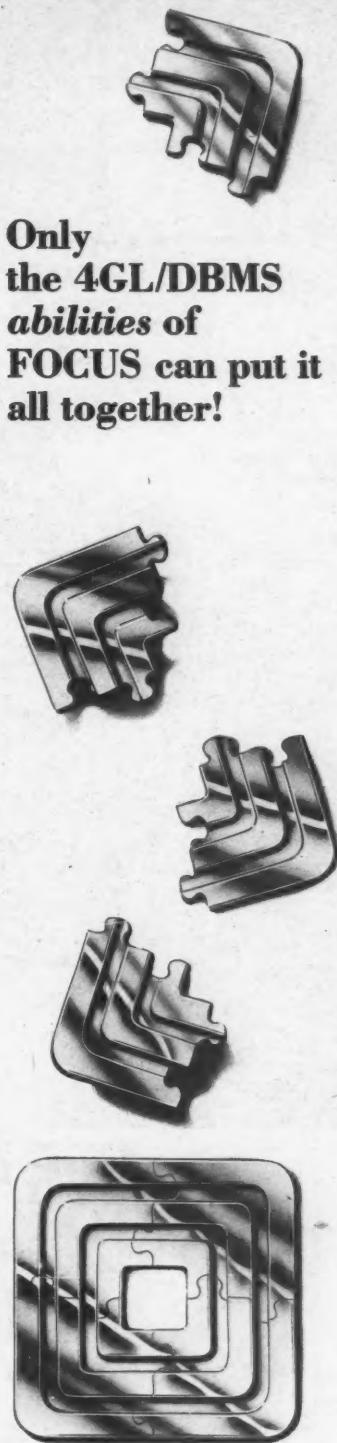
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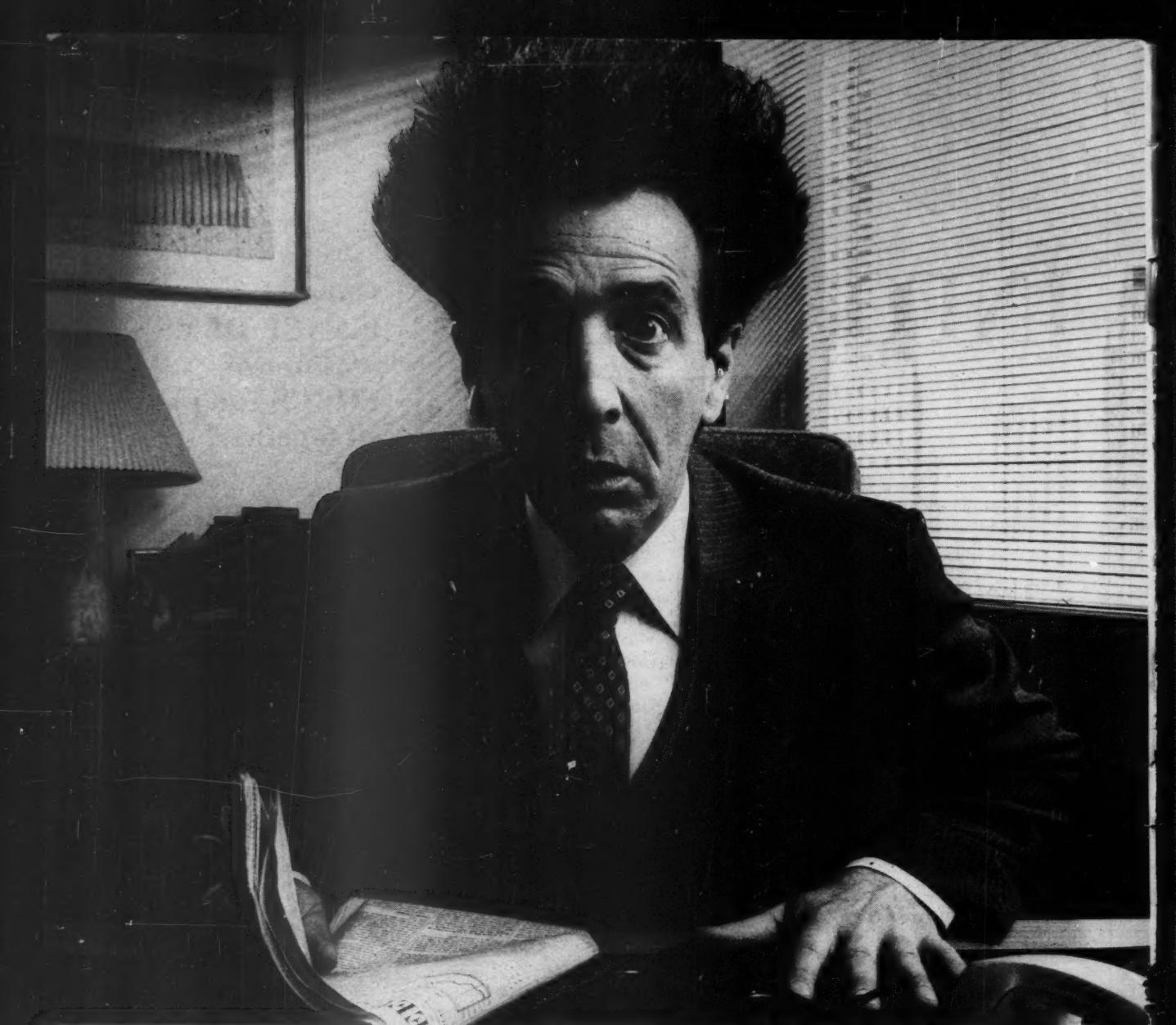
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